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PROCEEDINGS

OF THE

Biological Society of Washington

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VOLUME XV

1902

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ERRATA.

Page 55, line 18, instead of *viridus* read *viridis*.
Page 57, lines 28, 30, 31 and 32, instead of 1901 read 1902.
Page 196, line 13, instead of 1826 read 1816.
Page 246, line 9, instead of (skin and skull) read (in alcohol).

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For 1902.

(ELECTED DECEMBER 28, 1901.)

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VOL. XV, PP. VII-XVIII JANUARY 31, 1903

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 p. m. Brief notices of the meetings, with abstracts of the papers, are published in *Science*.

January 11, 1902—347th Meeting.

The President in the chair and 22 persons present.

F. A. Lucas exhibited a malformed mastodon tooth showing duplication of cusps.

The following communications were presented:

M. B. Waite: A Problem in Plant Physiology and Pathology.

W. H. Osgood: The Supposed Occurrence of Caribou on the Queen Charlotte Islands.*

Jacob Kotinsky: Present Opinion Concerning the Home of the San Jose Scale.

January 25, 1902—348th Meeting.

The President in the chair and 34 persons present.

W. H. Dall discussed the practice of rejecting zoological names preoccupied by those identical except in termination.

The following communications were presented:

David Griffiths: A Seed Planter.†

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*North Am. Fauna No. 21, pp. 26–28, 1901.

†Bull. Tor. Bot., Cl, **29**; 164–169, 1892.

F. A. Lucas: A Phase of the Blue Fox Question.*

R. H. True: The Physiology of Sea Water.

February 8, 1902—349th Meeting.

The President in the chair and 36 persons present.

The following communications were presented:

Chas. A. White: The Mutation Theory of von Hugo de Vries.†

H. W. Olds: Some Deductions from the Study of Bird Song.‡

February 22, 1902—350th Meeting.

The President in the chair and 18 persons present.

V. K. Chesnut exhibited a variety of spring scales for field use.

F. A. Lucas discussed a paper entitled Bird-killing as a Method in Ornithology.

The following communications were presented:

C. H. Townsend: The Present Status of the Carp in American Waters.

C. P. Hartley: Some Effects of Pollinating Premature Flowers.‖

L. H. Dewey: The Identity of Prickly Lettuce.

F. A. Lucas: The Armor of Stegasaurs.

March 8, 1902—351st Meeting.

The President in the chair and 78 persons present.

L. O. Howard exhibited photographs showing the supposed fibrous structure of artificial protoplasm.

The following communications were presented:

C. Hart Merriam: Protective and Directive Coloration in Animals.

L. O. Howard: Some Common Instances of Protective Coloration among Insects.

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*Science, XVI, 216, Aug. 8, 1902.

†Smithsonian Report for 1901, pp. 631–640, 1902.

‡Harper's Magazine, CV, pp. 474–478, Aug. 1902.

‖Bull. No. 22, Bureau Pl. Ind., U. S. Dept. Agric., pp. 1–39, Oct. 1902.

March 22, 1902—352nd Meeting.

The President in the chair and 27 persons present.

The following communications were presented:

C. W. Stiles: Eleven Miscellaneous Papers on Animal Parasites.*

W. C. Kendall: Notes on Sticklebacks.

W. H. Dall: Notes on *Trophon.*†

E. S. Steele: The Vegetation of Stony Man Mountain, near Luray, Virginia.

April 5, 1902—353rd Meeting.

The President in the chair and 38 persons present.

The following communications were presented:

Frank Baker and F. A. Lucas: The Area of Muscle Insertion as an Index to Power.

William P. Hay: The Subterranean Fauna of the United States.

April 19, 1902—354th Meeting.

The President in the chair and 33 persons present.

The following communications were presented:

B. W. Evermann: Notes on Some Mexican Fishes.‡

W. W. Cooke: Some Untenable Theories of Migration.

May 3, 1902—355th Meeting.

Ex-President Dall in the chair and 9 persons present.

Adjourned without program on account of lack of attendance.

May 17, 1902—356th Meeting.

The President in the chair and 45 persons present.

V. K. Chesnut exhibited lantern slides showing various poisonous plants.

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*Bull. No. 35, Bureau Animal Indust., U. S. Dept. Agric., pp. 1–59, 1902.

†Proc. U. S. Nat. Mus., XXIV, 533–550, March, 1902.

‡Bull. U. S. Fish Com. for 1901, pp. 137–159, figs. 1–8, May 3, 1902.

F. A. Lucas exhibited lantern slides showing a mounted skeleton of *Claosaurus* and a restoration based upon it.

The following communications were presented:

A. H. Howell: The Summer Birds of Mt. Mansfield, Vermont.*

W. W. Cooke: Bird Migration Routes.

June 1, 1902—357th Meeting.

The President in the chair and 30 persons present.

The following communications were presented:

C. W. Stiles: Surra, A Military Disease of Great Importance and Caused by a Protozoan.†

B. W. Evermann: The American Species of Shad.‡

October 18, 1902—358th Meeting.

The President in the chair and 30 persons present.

W. H. Dall discussed certain mollusks from South America and Alaska.

The following communications were presented:

R. E. B. McKenney: Luminous Bacteria.§

F. V. Coville: Plants of the Klamath Indians.

November 1, 1902—359th Meeting.

The President in the chair and 31 persons present.

H. J. Webber exhibited specimens of hybrid oranges from South Carolina.

The following communications were presented:

F. V. Coville: Dye Plants of the North Carolina Mountaineers.

E. W. Nelson: The Evolution of Subspecies as Illustrated by Mexican Quails and Squirrels.

November 15, 1902—360th Meeting.

The President in the chair and 48 persons present.

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*The Auk, N. Y., XVIII, 337–347, Oct. 1901.

†Bull. No. 42, Bureau Anim. Indust., U. S. Dept. Agric., pp. 1–30, 1902.

‡Rept. U. S. Fish Comm. for 1901, pp. 273–288, May 26, 1902.

§Proc. Biol. Soc. Wash., XV, pp. 213–234, Nov. 20, 1902.

M. W. Lyon exhibited photographs showing certain bats and their young.

M. C. Marsh exhibited samples of water contaminated by coal tar.

The following communications were presented:

C. L. Pollard: Some Aspects of the Flora of Cuba.

O. F. Cook: Stages of Vital Motion.

November 29, 1902—361st Meeting.

The President in the chair and 38 persons present.

The following communications were presented:

William Palmer: Variation in Downy Woodpeckers in Eastern Maryland and Virginia.

Vernon Bailey: Sleepy Grass and its Effects on Horses.

F. V. Coville: The Use of Sagebrush among the Klamath Indians of Oregon.

O. F. Cook: The Function of Latex in the Central American Rubber Tree.

December 13, 1902—362d Meeting.

Held in conjunction with the Washington Academy of Sciences, Dr. Theo. Gill in the chair and 47 persons present.

The retiring President Mr. F. A. Lucas delivered an address entitled "Flightless Birds."

December 27, 1902—363d Meeting.

The President in the chair and 13 members present.

The annual reports of the Recording Secretary and the Treasurer were read and approved. The following officers were elected for the year 1903.

President: B. W. Evermann.

Vice-presidents: W. H. Ashmead, F. H. Knowlton, T. S. Palmer, William P. Hay.

Recording Secretary: Wilfred H. Osgood.

Corresponding Secretary: T. W. Stanton.

Treasurer: David White.

Councillors: A. F. Woods, H. J. Webber, M. B. Waite, C. L. Pollard, J. N. Rose.

The President then announced the following standing committees for the year 1903:

Committee on Publication: William P. Hay, Gerrit S. Miller, Jr., David White.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE GENERIC NAMES OF THE NORTH AMERICAN SKUNKS.

BY ARTHUR H. HOWELL.

Dr. J. A. Allen, in a recent paper on 'The Generic Names of the *Mephitinæ*',* has presented a careful study of the nomenclatural questions relating to the genera *Mephitis*, *Spilogale*, and *Chincha*, reaching the conclusion that the changes in the application of these names which I proposed in my recent revision of the genus *Chincha*† rest on a faulty basis.

It is of course very much to be regretted that a generic name should ever have to be changed, and the case of the North American skunks, where the name of one genus is transferred to another is especially deplorable. It was on this account that I not only exercised great care in the investigation of the question, but also, before suggesting so important a change, invoked the aid of several of our best mammalogists, including Dr. Allen.

The change, however, then appeared inevitable, and after a very careful reading of Dr. Allen's paper, and a thorough rehearsal of all the evidence bearing on the question, I am still compelled to hold the same view.

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*Bull. American Museum Nat. Hist., XIV, pp. 325–334, Nov. 12, 1901.

†North American Fauna, No. 20, Aug. 31, 1901.

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It seems wise, in view of the radical differences between Dr. Allen's position and my own, to go over the evidence again in greater detail than was possible or necessary in my former paper. In order to facilitate comparison of the two arguments, I shall adopt the order of presentation used by Dr. Allen, and at the close give a summary of my own views.

The Genus Mephitis.

The whole question of the application of the name *Mephitis* hinges on the identification of Cuvier's '*conepate*'. If as Dr. Allen concludes, this is not one of the little spotted skunks, but the common two-striped skunk of the eastern United States, no further argument is required to support his contention, and the so-called 'restrictions' of Gray and Lichtenstein have no bearing on the question. For in that event the genus is not composite, but is composed of two congeneric species.

But Dr. Allen's position seems to be untenable. The '*conepate*' of Cuvier, although doubtless the equivalent of Buffon's '*conepate*,' is based primarily on *Viverra putorius* Linn., since Cuvier refers to Linnæus and to no other author; and *Viverra putorius* of Linnæus is admittedly based on Catesby's 'pol-cat' of Carolina, which he calls *Putorius americanus striatus.* In order to make the matter clear, I shall endeavor to show that Catesby's animal is referable to a species of *Spilogale*, and shall then trace the subsequent history of the species down to Cuvier's time.

The 'pol-cat' was described and figured by Catesby in his 'Natural History of Carolina,' published in 1731, this being the first account of any North American skunk. The description was prepared from his personal observation during a sojourn of several years in South Carolina and the adjacent portions of Georgia. He appears never to have visited Florida. Since it is important to show that he traveled in a region where *Spilogale* occurs, I will quote his brief itinerary, as follows:

> "The inhabited parts of *Carolina* extend West from the Sea about 60 Miles, and almost the whole Length of the Coast, being a level, low Country. In these Parts I continued the first Year * * * *. I then went to the Upper uninhabited Parts of the Country, and continued at and about *Fort Moore*, a small Fortress on the Banks of the River *Savanna*,

which runs from thence a Course of 300 Miles down to the Sea, and is about the same Distance from its Source, in the Mountains. I was much delighted to see Nature differ in these Upper Parts, and to find here abundance of Things not to be seen in the Lower Parts of the Country; this encouraged me to take several Journeys with the *Indians* higher up the Rivers, towards the Mountains * * * *."

As Mr. Bangs has shown, *Spilogale* probably does not occur in the coast region of South Carolina or Georgia,* but that both the large and small skunks occupy the mountainous portions of North Carolina is well known. It is entirely probable, therefore, that they are both found on the upper courses of the Savannah River. It was doubtless during one of his excursions 'up the rivers towards the mountains' that Catesby saw the animal which served as the basis of his drawing. A copy of his plate is presented with this paper. His description of the 'Pol-Cat' is as follows:

"This in Shape is not unlike our common Polcat, except that the Nose of this is somewhat longer: The Colour of all I have seen is black and white, tho' not always alike marked; this had a List of white, extending from the hind-part of the Head, along the Ridge of the Back, to the Rump, with four others, two on each Side, running parallel with it."

Following this is an account of the characteristic habits of the skunk.

Although neither the figure nor the description furnishes an accurate portrayal of either of the two skunks inhabiting the region where he travelled, the reference of both plate and description to *Spilogale* seems unquestionable. The chief discrepancy lies in the continuity of the white stripes, and in the statement that there are *five* stripes, the median one being on the ridge of the back. The real animal shows *four* parallel stripes on the back (two on either side of the median line), broken on the hinder parts of the body into numerous irregular markings, while lower down on each side an additional stripe runs parallel to the others for a part of their length. (See plate.)

When we consider that Catesby's drawing was probably made from his recollection of an animal seen afield, perhaps at some distance, and probably in the dusk of twilight, the differences between the figure and the real animal become unimportant. It must be remembered that it is not necessary to show that his figure is a correct representation of a *Spilogale:* the question is simply, could it have been based on anything else? Had he seen one of the large skunks, it is hardly conceivable that he would have represented an animal with *two divergent* stripes as having *five parallel* ones.

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*Proc. Boston Soc. Nat. Hist., XXVIII, p. 224, 1898.

The large skunks of the highlands of Carolina are extremely variable in color, some being almost entirely white on the upper surface of the body and tail, others nearly all black; in no case, however, are there more than two white stripes. The little spotted skunks of the same region, though subject to slight variation, always have the four parallel white stripes. The accompanying plate is presented in order to bring out clearly the resemblance of Catesby's figure to the little spotted skunk and its dissimilarity to the two-striped skunk. The figures of the skins (made from photographs) represent the average color patterns of the two species occurring in the region in question.

In view of the foregoing evidence, there seems to be no reason for doubting that Catesby's Polecat was based entirely on the little spotted skunk occupying the highlands of western Carolina, viz. *Spilogale ringens* Merriam. If the Florida species should later be shown to range northward as far as South Carolina, Catesby's animal may then be properly referred to that form.

Since the existence of a species of *Spilogale* in the region where Catesby traveled became known to naturalists, no one, so far as I know, excepting Dr. Allen, has ever questioned the applicability of Catesby's species to some member of that genus.

Even if it be admitted that there is room for some difference of opinion as to the identification of Catesby's species, it is customary in such cases to adopt the decision of the first author who revises the group. The name *Mephitis putorius*, based on Catesby's species, was first used by Dr. Coues, who applied it in a broad sense to all the little spotted skunks of North America.* Some years later, the name was definitely fixed by Dr. Merriam to the Florida species.† Its use by these two authors would seem to be sufficient to establish the name on a firm basis. The only way in which it can now be overthrown is to show beyond question that it cannot possibly apply to a *Spilogale*, which has not been done.

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*Fur-bearing Animals, p. 239, 1877.

†North American Fauna, No. 4, p. 7, 1890.

Pursuing the later history of Catesby's species, we discover that his account influenced strongly every author who treated the North American skunks down to the time of Cuvier.

Kalm, during his travels in Pennsylvania and New Jersey, learned of the presence of skunks in that region, where we know *Spilogale* does not occur, but his account of them,* as Dr. Allen says, is drawn largely from Catesby, and scarcely at all from personal observation. Furthermore, he identifies his Polecat with Catesby's.

Linnæus, the next author to treat of the North American skunks, described, in the 10th edition of his *Systema Naturæ* (1758), under the name *Viverra putorius*, an animal having *four* white stripes. He cited Catesby and Kalm.

Buffon, in 1765, described the same animal under the name of '*le conepate*,' attributing to it five white stripes. His plate is evidently a copy of Catesby's (a point not specifically mentioned by Dr. Allen), and he quotes a long extract from Kalm, choosing his account, rather than Catesby's, probably because it is fuller.

Schreber, in 1776, under the Linnæan name *Viverra putorius*, reproduced Catesby's plate again, and quoted Linnæus, Catesby and Kalm.

Finally in 1798, Cuvier adopted Buffon's name '*le conepate*' for a five-striped skunk which he identified with *Viverra putorius* Linn., and renamed *Mustela putida*.†

It will be seen from this résumé that the basis of Cuvier's '*conepate*' is primarily Catesby's Polecat, which has been shown to be a species of *Spilogale*. The references to Kalm are purely secondary, and should be accorded little weight, in view of the certain fact that Linnæus, Buffon, and Cuvier all described a species having five (or four) white stripes, and obviously based on Catesby's figure. Not a single element of the two-striped skunk appears anywhere in this chain except in Kalm's account, where owing to the absence of *Spilogale* from the region in which he travelled, the reference to the large skunk is implied.

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*Travels, Vol. II, p. 378, Stockholm, 1756.

†The reason he excluded *Viverra zorilla* from his group of *mouffettes* is because he considered it to be a weasel from the Cape of Good Hope, and not a skunk at all.

The second species in the original genus *Mephitis*, viz.: *'le chinche,' Viverra mephitis*, is admittedly one of the large North American skunks, the only question raised by Dr. Allen being the proper application of the specific name.

Hence, as stated in my previous paper, *Viverra mephitis* having been removed by Lesson in 1842 to form the genus *Chincha*, the remaining species, *V. putorius* (here shown to be applicable to the species now known as *Spilogale ringens*) becomes, by elimination, the type of the genus *Mephitis*.

The question of the type is not affected by the revisions of the genus by Gray (1837) and Lichtenstein (1838), for the reason that neither of the two groups composing the original genus was removed by them to another genus. Even on the assumption that Cuvier's first species (*V. putorius*) is not a *Spilogale*, neither Gray's revision nor Lichtenstein's is a 'restriction' or 'dismemberment' of the *original* genus (which according to this view contains but one group) but is simply a removal into new genera of species which had been associated with *Mephitis* by later authors.*

The Genus Chincha.

The applicability of the name *Chincha* to the large North American skunks is not questioned by Dr. Allen, except that he considers *Chincha* a synonym of *Mephitis;* but since he has opened the way for a fuller discussion of the evidence on this point, it may be well to refer to several facts which have come to my attention since the publication of my paper on the genus.

These facts relate to the basis of Lesson's type species, *Chincha americana*. A critical re-examination of the references cited under this name indicates that the last—that to F. Cuvier—is the most important, rather than the first—'*Viverra mephitis* Erxl.'—which, on account of its prominent position, I rather hastily assumed to be the one on which Lesson relied as the basis of his type. The importance of the reference to Cuvier is

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*In this connection it my be well to call attention to a *lapsus pennæ* in Dr. Allen's paper, where on page 328, in the 6th and 7th lines from the top of the page, the words 'first' and 'second' should be interchanged.

shown by Lesson's note that Cuvier's plate is a '*good figure*' of the species he is treating ('B. fig.'=*Bonne figure*), and by his assignment of 'Louisiana' as the type locality, that being the source of the specimen recorded by Cuvier. An examination of Cuvier's plate shows that it is indeed a 'good figure' of one of the North American two-striped skunks, and in the text we find the statement that the figure was based on a specimen which the elder Cuvier had in captivity, and which came from Louisiana.

In view of this certain evidence, it seems best to consider that *Chincha americana* Lesson, which is the type of the genus, was based largely on the animal described by F. Cuvier, which is referable to *Chincha mesomelas* (Licht.) This conclusion, of course, does not affect the validity of the name *Chincha*, but simply serves to fix with greater certainty the basis of the type.*

Viverra mephitis Schreber.

Dr. Allen has made a very clear presentation of the facts bearing on the tenability of this name. His conclusion, however, that it should be referred to *Mephitis macroura* Licht., seems to be based on a misapprehension of the facts.

The members of the *macroura* group (Subgenus *Leucomitra*) as I pointed out in my previous paper, are usually either wholly white or wholly black on the back, and in any case *never* have the divided stripe of the United States species (subgenus *Chincha*). The tail, in the majority of specimens, equals or exceeds the head and body in length, and never falls below 85 per cent of the combined length of head and body. Buffon's figure (of which Schreber's is a copy) portrays an animal with two broad divergent stripes separated by a small area of black; the tail is said to be *half* as long as the head and body.

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*In this connection, I may take occasion to publish a name which escaped me while preparing the list of specific names referable to the genus *Chincha*. (N. Am. Fauna, No. 20, p. 15). To that list should be added *Mephitis vulgaris* F. Cuvier, Hist. Nat. Mamm., VII, Table Gen. et. Method, p. 3, 1842, based on the plate and description of '*le Chinche*,' published in a previous volume of the same work (Hist. Nat. Mamm., III, livr. 28, 1821). Cuvier says in this connection: "This animal is the *Viverra mephitis* of the systematic catalogues; the name should be changed, since *Mephitis* has become the generic name."

It is evident, therefore, that the specimen on which the description was based came from some part of the United States or Canada, and not from Mexico. The figure can be exactly matched by specimens from the eastern States, and also by specimens of *estor* from Arizona. It could hardly be supposed to have come, however, from the latter region, and the most logical conclusion is that it was taken somewhere in the eastern part of the United States or Canada.

The amount of white on the back is excessive for the Canada skunk, so far as our present limited knowledge of the species indicates. The short tail, however, is strikingly diagnostic, for this is a character possessed by no other eastern species. In the absence of any definite knowledge of the origin of Buffon's specimen, it seems wise therefore to fix the name *mephitis* to the Canada skunk. If the name be rejected as unidentifiable, *mephitica* of Shaw would have to be rejected for the same reason, for Shaw's name has exactly the same basis as Schreber's, viz. Buffon's '*chinche*'. The name *mephitis*, although accredited to Linnæus, is not his name, for he wrote *memphitis*, a word of quite different meaning; furthermore, Schreber's description, as shown by Dr. Allen, is based on Buffon, rather than on Linnæus.

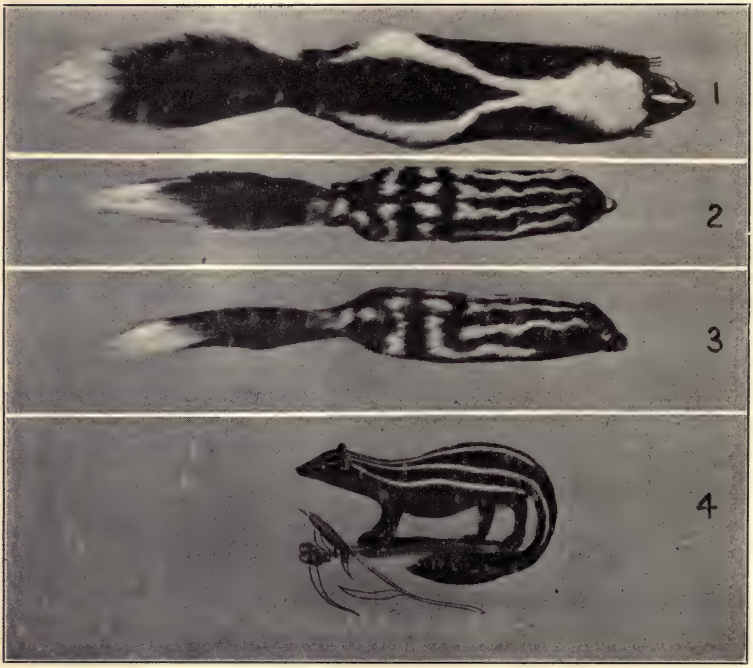
Summary.

1. The original genus *Mephitis* Cuvier, contained two species, the first of which (*Mustela putida*) is a little spotted skunk, the second (*Mustela mephitis*) a large two-striped skunk.

2. *Mustela putida* Cuvier, is based on *Viverra putorius* Linn., and therefore primarily on Catesby's *Putorius americanus striatus*, which is clearly referable to the little spotted skunk of the highlands of Carolina, i. e., *Spilogale ringens* Merr. Linnæus's reference to Kalm, since it is wholly secondary to the reference to Catesby, should have little weight.

3. Gray in naming *Conepatus*, and Lichtenstein in naming *Thiosmus*, did not restrict the genus *Mephitis*, but simply separated groups which had been associated with *Mephitis* by authors other than Cuvier.

4. When *Chincha* was proposed by Lesson, the original genus *Mephitis* had never been divided, nor had the type in any way been fixed. Hence his selection of the second group, rep-



THE TWO GENERA OF CAROLINA SKUNKS IN COMPARISON WITH CATESBY'S 'POL-CAT'.

resented by the species *Viverra mephitis*, to form a new subgenus was perfectly legitimate.

5. The type of the genus *Mephitis* was fixed, not by Lesson's assignment of the name to his third subgenus, but by the action of the principle of elimination, through the removal of *Chincha* from the original genus.

6. *Mustela putida* Cuvier, 1798, does not preoccupy *Mephitis putida* Boitard, 1842, for the reason that the former name, having been shown to be based on Catesby's Polecat rather than Kalm's, is applicable to a species of *Spilogale* (*Mephitis* as restricted) while Boitard's name belongs to the large skunk of New Jersey—a species of *Chincha*.

7. *Viverra mephitis* Schreber, cannot, on account of the color pattern and short tail of the type specimen, relate to any species of the subgenus *Leucomitra*. Its restriction to the skunk of eastern Canada is entirely within the bounds of a reasonable interpretation of the probable origin of the specimen on which the name was based.

EXPLANATION OF PLATE.

(From photographs).

Fig. 1. Skin of *Chincha putida*, from Washington. D. C.
Fig. 2. Skin of *Spilogale ringens* from Roan Mtn., N. C. (Top view.)
Fig. 3. Skin of *Spilogale ringens* from Roan Mtn., N. C. (Side view.)
Fig. 4. Reproduction of Catesby's plate of the '*pol-cat*'.

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PROCEEDINGS

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THE LARGE YELLOW POND LILIES OF THE NORTHEASTERN UNITED STATES.

BY GERRIT S. MILLER, Jr.

Plants of two very distinct types, the general aspect of which is shown in the accompanying illustration (plate ii), occur among the large Yellow Pond Lilies of the Northeastern United States commonly known as *Nymphæa advena.* Throughout New England (with the possible exception of parts of Connecticut), New York (except Long Island and the lower Hudson Valley), and the mountainous portions of Pennsylvania, plants with floating leaves are the invariable rule, while from the region of Washington, D. C., north through the lowlands east of the Alleghenies to Long Island and the lower Hudson Valley an erect plant is found to the complete exclusion of the other. The ranges of the two types are thus seen to coincide with the boundaries of the life areas of the region, that of the floating-leaved form embracing the boreal and transition zones, that of the erect plant the upper austral zone. In the New Jersey Pine Barrens the two types are found together; but this is scarcely an exception to the rule, as the biota of the region abounds in such juxtapositions of northern and southern forms. West of the Alleghenies the ranges of the two types are very imperfectly known, though so far as understood they again coincide with the life zones. The erect plant is found in Illi-

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nois, Indiana, and southern Michigan, that with floating leaves in northern Ohio, eastern Michigan, and in Wisconsin, Iowa, Minnesota, Montana and British Columbia.

The most obvious structural peculiarities of the two plants are found in the leaves. In the erect form the blade has somewhat pointed lobes and a widely open sinus (well shown in the lower right hand corner of the plate); petiole stout and nearly terete (fig. 1 *b*). In the floating form the lobes are rounded and the sinus narrow or often completely closed by the overlapping lobes. The petiole, relieved of all strain of support, is conspicuously flattened on the side corresponding to the upper surface of the leaf (fig. 1 *a*). This flattening robs the petioles of their strength so effectually that they are generally unable to hold the blades erect when, as sometimes happens, the plants are exposed by low water. In addition to its peculiar flattening the petiole is marked by a median rib, the prolongation of the midrib, and the margins are often, though not invariably, produced as distinct wings.*

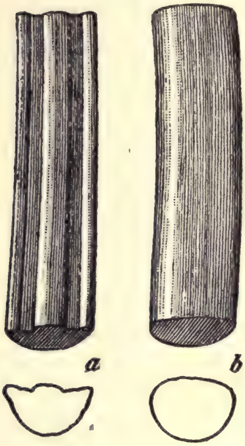

Fig. 1. Section of petiole near middle: *a Nymphæa variegata*, *b N. advena.*

The flowers and fruit though at first sight closely similar, differ in several important details. In the northern plant the inner surface of the sepals is almost invariably blotched with purplish red near the base; while in the southern the corresponding region is shaded with green. The fruit of the northern plant is smaller, less ribbed and often strongly suffused with red, while in the southern it is green throughout. Finally the stigma rays are as a rule more numerous in the southern plant. In 104 specimens of the latter collected at Four Mile Run, Va., the number of rays varies from 10 to 23, but in 64 percent it is between 14 and 17 (inclusive), with a well defined maximum (20 percent) on 16. In 108 of the northern form from Chau-

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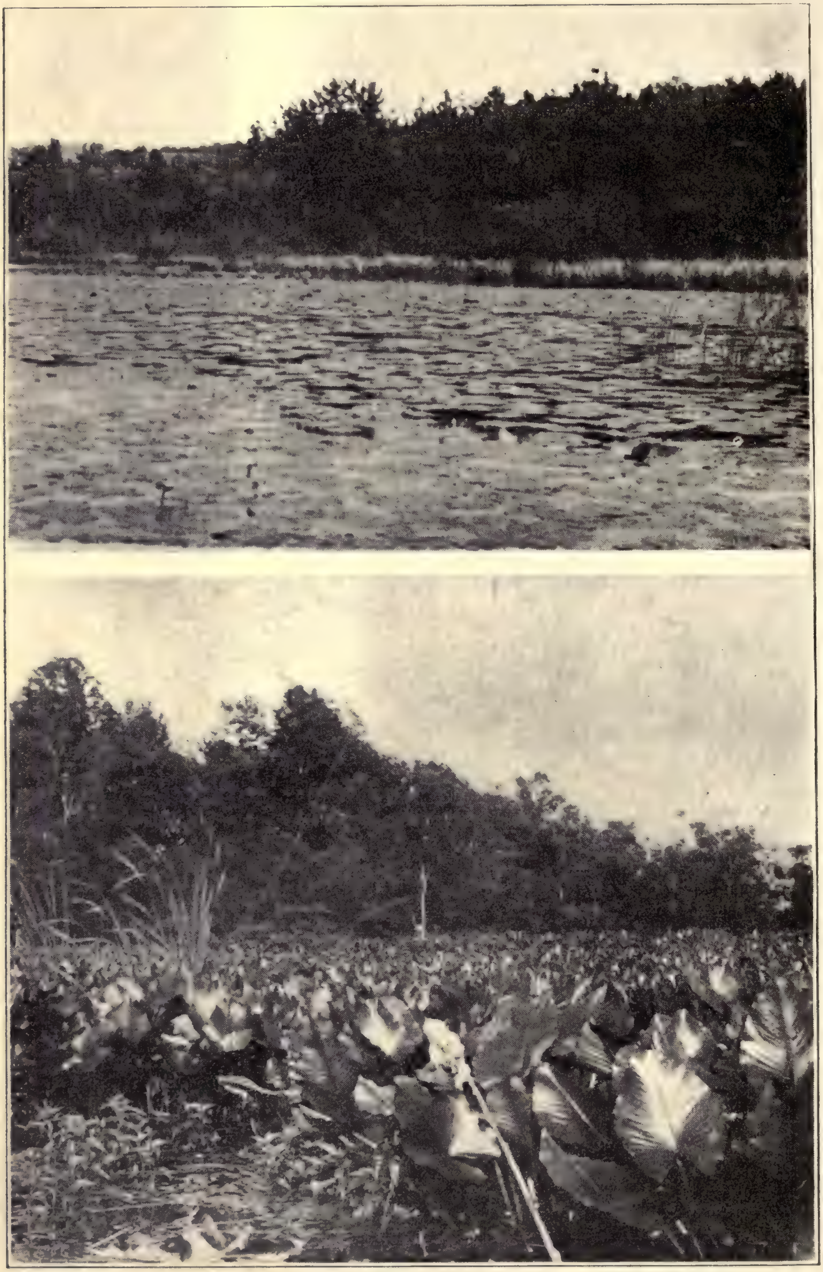
*It is of interest to note that the petiole of this plant is essentially the same as that of *Nymphæa lutea* the common representative of the genus in northern Europe.



NYMPHAEA VARIEGATA AND N. ADVENA.

tauqua Lake, N. Y., the number ranges from 9 to 16, but in 80 percent lies between 10 and 13 (inclusive) with a well marked maximum (36.1 percent) on 12.

I have referred to these plants as types rather than species because there is every reason to believe that each is an aggregate of several well defined forms. The erect, subterete-petioled plant is the true *Nymphœa advena* of Aiton* (type locality probably Philadelphia, Pa.). The floating, flat-petioled forms may for the present stand as *Nymphœa variegata* (Engelmann).†

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*[*Nympha*] *advenœa* Aiton, Hortus Kewensis, II, p. 226, 1789.

†[*Nuphar advena*] var. *variegatum* Engelmann in Gray, Man. Bot. Northern U. S., 5th ed. p. 57, 1867. Type probably from Michigan.

EXPLANATION OF PLATE.

Upper figure, *Nymphœa variegata* (Engelmann). Photographed at Lake Titus, near Malone, Franklin County, New York, by E. W. Nelson.

Lower figure, *Nymphœa advena* Aiton. Photographed at Monteur's Pond, Knox County, Indiana, by Robert Ridgway. The head of a man standing among the lily leaves may be distinguished near centre of this picture.

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PROCEEDINGS

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A NEW OPISTHOGLYPH SNAKE FROM FORMOSA.

BY LEONHARD STEJNEGER.

During a recent visit to the Naturhistorische Museum in Hamburg, the authorities kindly allowed me to examine and describe two specimens of an apparently new opisthoglyph snake collected by Dr. Warburg in Formosa. I am greatly indebted to Dr. Kræpelin, the Director, and to Dr. Pfeffer, the Curator, for permission to make the notes upon which the following description is based, as well as to Dr. Steinhaus, the assistant at the Museum, for kindly helping me in various ways.

The snake in question belongs to the genus characterized by Boulenger (Cat. Snakes Brit. Mus. III, p. 59, 1896,) under the name of *Dipsadomorphus* (Fitzinger, 1845).

This name is clearly antedated by Fitzinger's *Boiga* of 1826. The latter is a composite genus it is true, and Boulenger therefore quotes it in the synonymy of *Dipsadomorphus* as "*Boiga*, part., Fitzing.", but on page 31 (Neue Classif. Rept.) Fitzinger expressly states that the genus *Boiga* is based upon "Merrem's *Coluber irregularis*." This species, therefore, is the type of *Boiga*, a name which cannot be ignored simply because its own author dropped it 17 years after on account of its barbaric origin.

Boiga kræpelini, new species.

Type.—No. 1565, Naturhist. Museum, Hamburg; Kelung, Formosa; Dr. Warburg, collector.

Diagnosis.—Anterior palatine teeth enlarged; diameter of eye equals its distance from anterior border of nostril; upper preocular extending to upper surface of head but separated widely from frontal; scales in 21 rows, median row scarcely enlarged; ventrals 232-245; anal double; caudals 142-143 pairs; posterior chin-shields much shorter than the anterior; temporals 4-5, scale-like, irregular.

Habitat.—Formosa.

Description of type specimen.—About 11 solid maxillary teeth, subequal, slightly separated from grooved fangs which are not much enlarged; head very distinct from neck; eye large, equaling its distance from anterior border of nostril, with vertically elliptical pupil; rostral wider than high, barely visible from above; internasals much broader than long, much shorter than prefontals; frontal as long as broad, as long as its distance from rostral and as the interparietal suture; nasals large, posterior concave; loreal higher than long; 2 preoculars, the upper one reaching the upper surface of the head, but separated widely from frontal; 2 postoculars; temporals 4 + 5, scale-like, irregular; 9 supralabials of which the third, fourth and fifth enter the eye; 5 (on one side 6) lower labials in contact with anterior chin-shields which are much larger than the posterior pair; body compressed, about twice as high as wide; scales in 21 oblique rows, smooth, with apical pits, the vertebral row scarcely enlarged, the scales pointed behind; ventrals, 245, flat underneath, obtusely angulate laterally; anal double; subcaudals, 142 pairs. Color brownish gray, with about 57 darker cross-bars composed of blackedged scales from neck to anus, then cross-bars extending on the sides to about 4 scale rows from the ventrals; only faint indications of alternating lateral spots; top of head uniform brown; underside pale with a median area more grayish and laterally bordered by an irregular dusky line following the ventral angle.

Description of specimen No. 1569, Hamburg Mus.—The color description of this specimen which was also collected by Dr. Warburg near South Cape, Formosa; is as follows: Ground color paler and more grayish than the type (No. 1565) with better defined crossbands which alternate with a row of lateral spots approximately covering the third, fourth and fifth rows from the ventrals; the ventral median area darker and better defined; head with a median dark line on internasal and prefrontal sutures and middle of frontal, reappearing on the anterior part of upper neck as a median elliptical, brown spot; a similar brownish band from posterior half of supraoculars posteriorly to side of neck where it joins another originating on the upper part of the rostral and running obliquely through nostril and eye over posterior supralabials to side of neck; between these lines a pale gray band with whitish edges; supralabials also pale, more or less marked with dusky and with a dusky spot on the suture below the centre of the eye.

Remarks.—I take great pleasure in dedicating this new species to Professor K. Kræpelin, the distinguished director of the Museum in which the specimens here described are taken care of. It differs from most of the other species of the genus in having a double anal and a scarcely enlarged vertebral scale series; also in the very short posterior chinshields, and especially in the numerous small temporals.

SCALE FORMULA.

Hamburg Mus. No.	Scale rows.	Ventrals.	Anal.	Subcaudals.	Supralabials.	Preoculars.	Postoculars.	Temporals.
1565	21	245	$\frac{1}{1}$	$\frac{142}{142}$	9	2	2	4+5
1569	21	232	$\frac{1}{1}$	$\frac{143}{143}$	9 (10)	2	2 (3)	5+

Vol. XV, pp. 19-21 FEBRUARY 18, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW AMERICAN SPECIES OF *CHAMAECRISTA*.*

BY CHARLES LOUIS POLLARD.

Chamaecrista mirabilis.

Plant fruticose, erect, branching, 4-5 dm. high, quite glabrous, the branches slender and wiry; leaves on the main stem 12-18-foliolate, those on the lateral twigs only 4-12-foliolate; leaflets linear, 4-5 mm. long, finely cuspidate, the midvein only slightly excentric, the surface apparently entirely glabrous; petiolar glands 2, or rarely 1 or 3, situated just below the lowermost pair of leaflets; both glands small, discoid, borne on very slender styles, that of the basal gland being from 5 to 7 mm. in length; stipules linear-acuminate, striate, persistent; flowers not observed; legumes borne on pedicels surpassing the leaves, linear in outline, nearly straight, glabrate, 12-15 seeded, dehiscent with elastic valves at maturity.

Type in herbarium New York Botanical Garden, collected at Rio Piedras, Porto Rico, by Mr. and Mrs. A. A. Heller, February 27, 1899 (No. 642). The plant is remarkable for the presence of one and sometimes two, supernumerary glands, situated above the normal petiolar gland found throughout the Chamaecristae verae. It is a member of the nictitans series, of slightly shrubby habit, or lower stature than *C. aeschinomene*, and with neither the pubescence nor the gland of that species.

Chamaecrista bellula.

Plant slender, erect, 3-4 dm. high, the branches ascending; stems and rachises puberulent; leaves 5-10-foliolate, the leaflets linear-elliptical, glabrous, 6-10 mm. long, of thin texture, minutely apiculate, the midvein rather excentric, not prominent; petiolar gland crateriform, subsessile; stipules linear, acuminate, membranaceous, striate; peduncles 1-flowered, almost always bibracteolate, supra-axillary; flower 2 cm. broad; sepals linear, attenuate, nearly equalling the obovate petals; legume 6-7 cm. long, linear, puberulent; seeds ovoid, compressed, oblique.

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*Published by permission of the Secretary of the Smithsonian Institution.

Type in the United States National Herbarium, collected by Prof. S. M. Tracy at St. Vincent, Florida, September 9, 1899 (No. 6,326). A very graceful species, perhaps approaching *C. Mississippiensis* in the small size of its leaflets, but distinguished by its erect habit, its uniform pubescence, its leaflets, which are only half as many as those of *C. Mississippiensis*, and also by the fact that it is annual and herbaceous.

Chamaecrista brachiata.

Plant 1 m. high or less, woody at base, with tough, freely branching glabrate stems; stipules lanceolate, acuminate, striate, and strongly persistent; leaves 10-14-foliolate, with a very depressed discoid petiolar gland; leaflets linear, glabrous on both surfaces, the midvein somewhat excentric, the obtuse apex tipped with a slender cusp; flower large, 3 cm. in diameter, the broad yellow petals considerably exceeding the lanceolate scarious sepals, legume linear, 6-7 cm. long, quite glabrous when mature; seeds quadrate, oblong, compressed on both sides.

Type, No. 330,115, in the United States National Herbarium, collected by Charles L. Pollard and G. N. Collins at Miami, Dade County, Florida, April 4-7, 1898 (No. 245). The plant grows entirely in open barrens or scrubs, often forming bushes of considerable size; it is associated with no other Chamaecrista. The same species has been collected by A. Fredholm in Duval County, September 11, 1893, showing that the blooming period extends throughout the season. It differs from *C. fasciculata*, the only other large-flowered species in south Florida, in being fruticose, in the much more numerous and narrowly linear leaflets, and also in having a discoid rather than oblong, petiolar gland. The corolla is clear lemon-yellow, with no suggestion of orange, and the petals considerably exceed the sepals.

Chamaecrista littoralis.

Plant tall, erect, diffusely branching, the branchlets and younger shoots finely puberulent; stipules persistent, lanceolate, sharply attenuate, 3-5-nerved, the margin usually hispidulous; leaves oblong or oblong-lanceolate in general outline, 1-4 cm. long, both surfaces sparsely puberulent; leaflets 6-12 pairs, elliptical, prominently cuspidate, 5-8 mm. long; midvein more or less excentric; petiolar gland cupuliform, practically sessile; flowers about 2-2.5 cm. in width, on slender solitary peduncles 1-1.5 cm. long; petals exceeding the linear-lanceolate scarious sepals; legume densely pubescent, not at all falcate, 4-5 cm. long; seeds quadrate, compressed, dark brown.

Type, No. 371,572 in the United States National Herbarium, collected by Prof. S. M. Tracy and Prof. F. E. Lloyd on Breton Island, La., August 17, 1900 (No. 198). I consider that No. 155 of the same collectors from Biloxi, Miss., September 4, 1900, No. 3,953, S. M. Tracy, Biloxi August 30, 1897, and No. 1,423 of my first distribution of Mississippi plants (Biloxi, September 15, 1896) are all referable to this species. The last cited specimen was distributed as *Cassia depressa* Pollard, a species with which *littoralis* has heretofore been confused. The type of *depressa*, (which Professor Greene has now identified with the *Cassia chamaecristoides* of Colladon) is a plant of low spreading habit, exhibiting little or no pubescence, with scattered, very narrow leaflets, and much compressed glands. *C. littoralis* varies somewhat in the number of its leaflets, but they are always compact or crowded, and never scattered on the rachis. It is, moreover, a distinctly maritime species, the numerous stations from which I have material being all situated on the coast or on outlying islands in the Gulf of Mexico. The prominently apiculate leaflets serve to distinguish it from *C. fasciculata* and *C. depressa.*

Chamaecrista tracyi.

Plant erect, herbaceous, freely branching, the branches inclined to be lax and spreading; stems and foliage densely clothed with a slightly glandular pubescence; leaves 4-9-foliolate, 2-3 cm. long, the leaflets oblong or elliptical, very small (5-8 mm. long); petiolar gland cupuliform, sessile near the base of the rachis; stipules setaceous; flowers solitary, on slender axillary or supra-axillary peduncles as long as the leaves or longer, upcurved in fruit; corolla 1-1.5 cm. wide; sepals narrowly linear, acuminate, about equaling the petals; legumes pubescent 4 cm. long, rather markedly rostrate; mature seeds not observed.

Type in the United States National Herbarium, collected by Prof. S. M. Tracy at Koshtaw, Miss., September 15, 1898. In appearance this plant forms a link between the large-flowered and the small-flowered sections of the genus; it is chiefly conspicuous, however, for the long-pedunculate flowers approaching in size those of certain West Indian species, but not at all like any species within our own borders. The cupuliform gland, moreover, resembles the gland found in members of the sub-genus Nictitella. The leaflets are very small, and quite constant in dimensions.

In dedicating this species, in many respects the most interesting in the genus, to Professor Tracy, I wish to record my very great obligations to him and to Prof. F. S. Earle, now of the New York Botanical Garden, for the material they have so generously placed at my disposal from time to time.

VOL. XV, PP. 23-29 MARCH 5, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

RIBES AUREUM AND RIBES LENTUM.

BY FREDERICK V. COVILLE.

Ribes aureum.

In the year 1814 Frederick Pursh published a description of a yellow-flowered currant from the western United States under the name *Ribes aureum.* This species, or group of species, constitutes a clearly defined type, confined in its natural range to western North America, which has been treated by most botanists as a subgenus of *Ribes* named *Symphocalyx*, and by one author was even made a distinct genus, *Chrysobotrya.* It was introduced into cultivation in Europe early in the nineteenth century, and became a great favorite on account of its golden flowers, with their often deliciously spicy odor, and its handsome amber-colored, wine-colored, or black berries. These cultivated forms have differed considerably and on them have been based several descriptions of supposed new species. Some of these are known only in cultivation, and seem therefore to be merely horticultural varieties and to have no existence in nature either as species or subspecies. There are, however, two forms occurring wild in the United States which are commonly distinguished by botanists. In one of these, abundant in the Columbia River valley of Oregon, Washington, and Idaho, the leaves of vigorous shoots have the margins of the lobes incurved toward the apex, and obtuse-angled; the racemes are commonly 10 to 15-flowered, and the ordinarily odorless flowers are about 11 mm. in length, from the base of the ovary to the apex of the petals, when dry. In the other plant, which is a native of the Missouri River region, the leaves on vigorous shoots have lobes with straight margins and the apex acute-angled, the racemes have commonly 2 to 8 flowers with the spicy odor of the carnation, and the corresponding measurement in the dried flower is about 16 mm. The facts brought out in the present paper show that the name *Ribes aureum* Pursh must be restricted to the Columbia plant, which ordinarily has passed under the name *Ribes tenuiflorum* Lindl. and that the Missouri plant, which is frequently cultivated in old gardens and which commonly passes under the name *Ribes aureum* must be called *Ribes longiflorum* Nutt.

Turning to the original description of *aureum** we find the following citation of types. "On the banks of the rivers Missouri and Columbia. *M. Lewis* [sign for woody plant] April. *v. s. in Herb. Lewis; v. v.* in Hort." By referring to Mr. Thomas Meehan's paper on the plants of the Lewis and Clark Expedition,† to Dr. Elliott Coues' notes on Mr. Meehan's paper,‡ and to Dr. Coues' edition of the History of the Lewis and Clark Expedition, four volumes, 1893, it appears that of the two specimens in Lewis' herbarium, now on deposit in the herbarium of the Academy of Sciences, Philadelphia, one was collected on the site of the present town of The Dalles, in Oregon, April 16, 1806, the other on the Missouri River, in Montana, at the junction of the Jefferson, Madison, and Gallatin rivers, July 29, 1805. The cultivated plant indicated by Pursh's "*v. v. in Hort.*", there is good evidence, is the common cultivated large-flowered sweet-scented plant above referred to. Whatever the Montana plant might prove to be, it is certain that the Oregon specimen is the Columbia form, and the cultivated plant being the Missouri form, Pursh's *Ribes aureum* is, therefore, a complex of the two.

Lindley in 1830§ distinguished the two forms, and named the

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*Pursh, Fl. Am. Sept. 1: 164. 1814.

†Meehan, Proc. Acad. Nat. Sci. Phila. 1898: 12–49. 1898.

‡Coues, Proc. Acad. Nat. Sci. Phila. 1898: 291–315. 1898.

§Lindl. Trans. Hort. Soc. Lond. 7: 242. 1830.

Columbia plant *Ribes tenuiflorum*, retaining the name *aureum* for the Missouri plant. Previous to this, however, Berlandier had divided Pursh's *Ribes aureum* into two species, *aureum* and *flavum*,* a treatment of the group in which he was followed by Colla†. There is, furthermore, a still earlier segregation of *Ribes aureum*, in the year 1816, in the Botanical Register, which takes precedence over the work of all these writers.

In the paper in question‡ *Ribes aureum* was treated by Ker as a species including both the Columbia plant and the Missouri plant, but the latter was made an unnamed variety of the former with the diagnosis "Foliis villosiusculis, pedunculis villosissimis." Following this diagnosis is the citation:

> *Ribes longiflorum.* Fraser's cat. (1813). Ad specim. plura spontanea lecta ad Missouri fluvium à D. Nuttall et in Louisiana superiori à D. Bradbury in Herb. Dom. A. B. Lambert asservata.

In Fraser's Catalogue the name *Ribes longiflorum* is a nomen nudum, but in this paper by Ker, as shown above, a brief but correct diagnosis is given with a citation of type specimens and a type locality, and an excellent colored plate made from plants grown from Nuttall's imported seeds or cuttings. With reference to the type locality, it should be noted that Nuttall and Bradbury did not ascend the Missouri farther than the eastern part of Mercer County, North Dakota, and did not, therefore, meet with the Columbia plant.

It may be well to add, as a sort of postscript to this short paper, a suggestion regarding the making of supposed new species in the *aureum* group of Ribes, should the wide range and variable character of the group lead anyone to the publication of such species. The group is already supplied with an assortment of names amply sufficient for most nomenclatorial purposes and the availability of any of the supply on hand should be ascertained before any new name is added. The names I have found published in the group, as either specific or varietal designations, or as hybrids, are as follows:

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*Berlandier, Mem. Soc. Phys. Geneve 32: 60. 1826.

†Colla, Mem. Accad. Torin 33: 114. 1826–9.

‡Ker, Bot. Reg. 2: *t. 125.* 1816.

aureum
beatonii
billiardii
chrysococcum
cinerascens
coccineum
ebracteatum
flabellaris
flavum
fontainesii
fragrans
glabratum
gordonianum
inodorum
intermedium
jasminiflorum
leiobotrys
lindleyanum
longiflorum
loudoni
lucidum
missuriense
odoratum
oregoni
palmatum
praecox
proximum
revolutum
sanguineum
serotinum
tenuiflorum
tubiflorum
vergens
villosum

Ribes lentum.

In 1876 Dr. Asa Gray published* a variety *molle* of *Ribes lacustre*, giving it a range in the Sierra Nevada of California at 6,000 to 10,000 feet, from Mariposa County northward. Under this name the plant has usually passed. As now understood it is a species of wide distribution in the western United States and clearly distinct from *lacustre.* In the matter of names this little currant has been amply honored. In 1894 Professor A. J. McClatchie published a *Ribes nubigenum*† which he had collected at an elevation of 10,000 feet on the summit of Mount San Antonio, or "Baldy," on the line between Los Angeles and San Bernardino counties, southern California. Three years later, the name *nubigenum* proving to be a homonym, the name *montigenum* was substituted.‡ A careful examination of a duplicate type specimen indicates that this plant must be considered specifically identical with Dr. Gray's

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*Gray, Bot. Cal. 1: 206. 1876.

†McClatchie, Erythea 2: 80. 1894, not Phil. 1856.

‡McClatchie, Erythea 5: 38. 1897.

lacustre molle. Meanwhile Mr. Marcus E. Jones, in 1895, had published* a *Ribes lacustre lentum* based on specimens collected at an elevation of about 10,000 feet in the Henry Mountains and on Belknap Peak, southern Utah. In publishing the variety the author called attention to the possible identity of *lentum* and *molle*, a point that could only be determined by an examination of the type specimens of the latter. This has now been done and shows the two to be the same.

My attention was recently called by Professor C. V. Piper to the fact that among the specimens referred by Gray to his *Ribes lacustre parvulum*† are some which belong in reality to *Ribes lacustre molle* Gray, and the suggestion was therefore made that the varietal name *parvulum* should be taken up as the specific name of the plant under discussion. In his original description Dr. Gray characterized his variety as with nearly glabrous leaves, smaller than those of the type form of *lacustre*, as occurring in "the Rocky Mountains and north to British Columbia," and as having been mistaken formerly for *Ribes setosum.* An examination of the material in the Harvard Herbarium shows that Dr. Gray named as *Ribes lacustre parvulum* six specimens which he had formerly determined as *setosum*, as follows:

"Rocky Mts. Hook. Dupl. Fl. Bor. Am. '*R. oxyacanthoides.*'"

"Hort. Cantab. Anno 1846 (178 Loddiges)."

"Isle St. Ignace, L. Superior."

Hall & Harbour's No. 184 of their Rocky Mountain Flora.

Parry's No. 149 of his Rocky Mountain Flora.

Watson's No. 376 of the King Survey, from the Uinta Mountains, Utah.

The first three of these are *lacustre*-like plants with smooth and small leaves, while the last three are *Ribes lentum.* We have therefore no definite fixation of the type in the original specimens. Turning to the customary treatment of *parvulum* in herbaria and published papers, we find that botanists have applied the name either to the small and smooth-leaved, black-fruited plant so frequent in the northern Rocky Mountains, or, as did Dr. Gray, to both that plant and *lentum*. Dr. P. A. Rydberg in raising *parvulum* to specific rank* cited the original description of Gray and that of Professor Coulter's Manual, assigned to it a range "among rocks on the highest mountains [of Montana] at an altitude of about 3000 m.," and cited four specimens. A duplicate of one of these (Rydberg & Bessey No. 4251) is in the National Herbarium and this belongs to the smooth-leaved plant already mentioned. But another of the specimens cited by Dr. Rydberg (Tweedy No. 831) is clearly referable to *lentum*. It is evident therefore that the confusion of two plants under the name *parvulum* still continues, and in deciding which of them should be treated as the real *parvulum*, it seems proper to exclude the plant known as *lentum*. Therefore the first of the specimens in the Harvard University Herbarium cited above, collected in the Rocky Mountains of British America, is designated as the type of *Ribes lacustre parvulum* Gray.

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*Jones, Proc. Cal. Acad. II, 5: 681. 1895.

†Gray, Bot. Cal. 1: 206. 1876.

The name of the species necessarily becomes **Ribes lentum** (Jones) Coville & Rose, for the varietal name *molle*, if raised to specific rank as has been done by Mr. Thomas Howell,† cannot be maintained, as it is a homonym of the earlier *Ribes molle* of Poeppig, 1858. It is believed that these are all the published names for the plant, although Professor Aven Nelson has recently distributed specimens with a herbarium name, the publication of which, after the establishment of the identity of his plant with *Ribes lentum*, has now been abandoned.

Ribes lentum is distinguished from *Ribes lacustre* by its smaller size, smaller leaves, shorter and fewer-flowered racemes and especially its pubescent and glandular-hairy foliage. To this must be added another important character noted by Dr. J. N. Rose in Wyoming in 1893, namely the color and taste of the fruit. In *Ribes lacustre* the mature fruit is dark purple or almost black, and to most persons nauseating; in *lentum* the berry is a bright red, and though rather dry is quite palatable, indeed Dr. Rose found it in common use for jam. The species has a wide distribution in the high mountains of the arid west; from Arizona and New Mexico northward in the Rocky Mountains through Colorado and Wyoming to Idaho, and westward across Utah and Nevada through the arid eastern portions of California, Oregon, and Washington. It has also been collected in southern British Columbia. It occurs on the east slope of the Cascades in Washington, and again in California from the Sierra Nevada to the San Jacinto Mountains, but in Oregon it has not yet been found on the Cascade Mountains though it has been collected on Steen Mountain, the Warner Mountains, Gearhart Mountain, and the Paulina Mountains, all elevations in the plains of eastern Oregon and the last connected by a belt of timber with the Cascades, on the eastern slope of which the plant ought sometime to be found.

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*Mem. N. Y. Bot. Gard. 1: 203. 1900.

†Howell, Fl. Northw. Am. 1: 209. 1898.

574.0673

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PROCEEDINGS

OF THE

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DESCRIPTION OF A NEW SWALLOW FROM THE WESTERN UNITED STATES.

BY EDGAR A. MEARNS.

Comparison of topotypes of *Tachycineta thalassina* Swainson* with the Violet-green Swallow of the United States shows the two forms to be different. The latter is described below.

Tachycineta lepida sp. nov.

NORTHERN VIOLET-GREEN SWALLOW.

Type.—No. 133,522, U. S. National Museum. ♂ ad. collected June 9, 1894, at Campbell's ranch in the Laguna Mountains (Coast Range), 20 miles north of Campo, in San Diego County, California, by Edgar A. Mearns. Original Number, 11,014.

Characters.—Similar to *Hirundo thalassina* Swainson, but smaller, with the violet or "lilac" of the back replaced by bottle green, and the green of the rump and upper tail-coverts replaced by violet of a shade between the violet and Indian purple of Ridgway's color manual, the patterns being exactly reversed in the two forms. In winter, the proximal secondaries are broadly edged with white, which is not the case in the winter specimens of *Tachycineta thalassina* examined.

Description of type (♂ ad).—Length, 134 mm.; alar expanse, 310; wing, 118; tail, 50; culmen (chord), 6.2; tarsus, 11.2; middle toe with claw, 13.7. The folded wing, in the recently-killed specimen, extended 13 mm. beyond the tail. Top of head parrot green. Nape with a narrow collar of Indian purple. Whole of back bottle green, faintly glossed with violet when viewed in a certain light. Rump and upper tail-coverts, violet, shaded with plum-purple. Wing and tail quills, black, strongly glossed with indigo above, their under surfaces slate-gray; wing-coverts violet, edged with parrot green. Two white patches on the rump, one on each side; these, in life, are brought close together so as to form an apparently continuous white band across the rump. Under surface all white, except the flight-feathers, this extending to the hind neck and ear-coverts. Iris brown. Bill, brownish black. Feet, dark brown; claws, black.

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*Philos. Mag., n. s., I, p. 366, No. 6, 1827, ("Table land; Real del Monte, by Mr. Morgan.")

Adult female.—Similar to the male, but smaller, with color much duller, the white of ear-coverts and hind neck much mixed with brownish gray.

Young.—Similar to the same stage of *Tachycineta bicolor* (Vieillot) but with feathers of lower parts grayish beneath the surface; easily distinguished by its smaller bill.

Comparison.—Adult male, No. 143,516, U. S. National Museum collection, taken on Mt. Popocatepetl, Mexico, February 23, 1893, by E. W. Nelson, a typical example of *Tachycineta thalassina* (Swainson), measures as follows: wing, 127 mm.; tail, 58; exposed culmen, 5.6; tarsus, 11; middle toe with claw, 15. The whole back is of a color intermediate between Indian purple and violet, changing to green if viewed in a certain light. The rump and upper tail-coverts are bottle green.

Geographic range.—Western United States, from the eastern base of the Rocky Mountains to the Pacific, north to British Columbia and Alaska, (breeding throughout this range) south, in winter, to Guatemala and Costa Rica.

Remarks.—Breeding birds of the present form from Arizona and northern Mexico suggest—by larger size and occasional green feathers in the rump and upper tail-coverts—but by no means prove intergradation with *Tachycineta thalassina.* I am indebted to Dr. Louis B. Bishop for specimens collected by him on the Yukon River, in July, 1899. These are small, an adult male measuring: Wing, 112 mm.; exposed culmen, 5.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF THREE NEW BIRDS FROM CUBA AND THE BAHAMAS.*

BY WILLIAM PALMER AND J. H. RILEY.

Owing to the continuation of our work in Cuba it has been thought best to postpone the publication of the entire results of our expedition there in 1900. Meanwhile it seems desirable to publish the descriptions of the three following birds:

Zenaidura macroura bella subsp. nov.

Type.—No. 172,537, U. S. National Museum, ♂ ad., Mariel, Cuba. Collected May 9, 1900, by William Palmer and J. H. Riley.

Characters.—Similar to *macroura* of the eastern United States but smaller.

Remarks.—Six adult males from Cuba average,—wing, 137.5; tail, 123.5; exposed culmen, 13 mm. Eight adult males from the eastern United States average,—wing, 150.5; tail, 140.5; exposed culmen, 14 mm. The band on the upper surface of the tail is less distinct in our Cuban birds than in those from the mainland, and there are other slight differences in color, but the size alone is sufficient ground for separation.

Columbigallina passerina aflavida subsp. nov.

Type.—No. 171,194, U. S. National Museum, ♂ ad., San Diego de los Baños, Cuba. Collected April 10, 1900, by William Palmer and J. H. Riley.

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Characters.—Similar to *passerina* of Jamaica, but the bill black with a little red at the base; plumage slightly grayer.

Remarks.—The ground dove from Cuba differs from the Bahaman ground dove in being darker, above and below, with less whitish on the belly and crissum. The ground dove from Jamaica* is very similar to the Cuban form in size, but has a reddish cast to the plumage, and the base of the bill is yellow (orange in life); the bill of the Cuban bird is wholly black, except at the base of the lower mandible where it is red in life. The bird from the Bahamas is said to have the bill wholly black in life. The bird from Florida, *C. passerina terrestris*, is the largest of the four forms under consideration, and the plumage is of a grayer cast than in either *passerina* or *aflavida*, but not as light as in *bahamensis;* the base of the bill is red in life, drying out to yellowish in the skin.

Riccordia æneoviridis sp. nov.

Type.—No. 108,572, U. S. National Museum, ♂ ad., Abaco, Bahamas. Collected March 27, 1886, by U. S. Fish Com. Str. Albatross.

Characters.—Above and below bright bronze-green; wings purplish black; tail above bronze, deepening into black, with bronzy reflections on the two outer pairs of feathers; tail below deep steel blue; upper tail coverts bronze; crissum and lower belly white; a white spot a little above and behind the eye; upper mandible, in the dried skin, black; lower mandible yellowish, tipped with black.

Measurement of type.—Wing, 53; tail, 43.5; exposed culmen, 17; middle tail feathers, 22.5 mm.

Remarks.—The bird from Abaco is of a more coppery green both above and below than the bird from Cuba. In the Abaco bird the bill is slenderer, the fork of the tail less pronounced, and the middle tail feathers broader than in Cuban birds; also the tail of *ricordii* is not coppery bronze as in Abaco birds. Fourteen males from Cuba average: wing, 52.5; tail, 44; middle tail feathers, 21; exposed culmen, 18 mm. Fifteen males from Abaco average: wing, 52.5; tail, 42; middle tail feathers, 23; exposed culmen, 17 mm.

The type of Lawrence's *bracei* came from New Providence and is a mummy. Comparing the bird from Abaco with this type, shows it to be a different bird or else the colors have changed in *bracei*. The type of *bracei* is of a more coppery green, and the throat is of a brighter, and altogether different shade of green than in the series of Abaco birds before us. The bill of *bracei* is longer than in either Abaco or Cuban birds. The type of *bracei* measures: wing, 45; exposed culmen, 19 mm.

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*We are indebted to Mr. Outram Bangs, for the loan of a series of Jamaican ground doves in the collection of the Museum of Comparative Zoology.

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VOL. XV PP. 35-39 MARCH 5, 1902

PROCEEDINGS
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GENERAL NOTES.

Note on the name Rhopocichla.

Rhopocichla was first used by Oates in 1889 (Fauna Brit. India, Birds, I, 159) for an Indian Timeline bird. Two years later Dr. Allen employed the same term (Bull. Am. Mus. Nat. Hist., III, 199, 1891) for a South American Ant Thrush. As the use of the same name in two families of birds is liable to lead to some confusion it is proposed to replace Dr. Allen's *Rhopocichla* by *Rhopornis* (type *Myiothera ardesiaca* Wied).—*Charles W. Richmond.*

The technical names of two Dogbanes from the District of Columbia.

In his recently published Manual of the Flora of the Northern States and Canada, Dr. N. L. Britton transfers the name *Apocynum medium* Greene to the Dogbane which, in my paper on the species occurring in the District of Columbia,* I described as *A. speciosum.* For the *Apocynum medium* as there defined, he proposes the new name *A. milleri.* Beyond the brief citation of synonyms no reason is given for these alterations; and after a careful examination of the facts I am forced to regard the change as quite unwarranted.

At the time of my revision of the species Professor Greene informed me that he had based the name *medium* on a plant growing at a well-known locality in Brookland, D. C. At this station there is found only one species of *Apocynum*, living and fresh specimens of which furnished the material for my description. Since the publication of Doctor

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*Proc. Biol. Soc., Washington, XIII, pp. 79-90, September 28, 1899.

Britton's 'Manual' I have examined, in company with Mr. Chas. L. Pollard, the specimen in Professor Greene's herbarium stated by him to be the type of *Apocynum medium*. It agrees in all respects with the plant to which I applied the name, and in no way suggests *A. speciosum*. The name *milleri* Britton is therefore a synonym of *medium* Greene. The two species in question should stand as follows:

APOCYNUM MEDIUM Greene.

1897. *Apocynum medium* Greene, Pittonia, III, p. 229, December, 1897.

1899. *Apocynum medium* Miller, Proc. Biol. Soc., Washington, XIII, p. 84, September 28, 1899.

1901. *Apocynum milleri* Britton, Manual Flora Northern States and Canada, p. 739, November, 1901.

APOCYNUM SPECIOSUM Miller.

1899. *Apocynum speciosum* Miller, Proc. Biol. Soc., Washington, XIII, p. 83, September 28, 1899.

1901. *Apocynum medium* Britton, Manual Flora Northern States and Canada, p. 739, November, 1901.

—*Gerrit S. Miller, Jr.*

A fully adult specimen of Ophibolus rhombomaculatus.

On October 16, 1901, I obtained a fully adult *Ophibolus rhombomaculatus*, apparently the first to be recorded. The snake was found freshly killed in a farm road a few miles west of Alexandria, Va. It is 1090 mm. in length (of which the tail forms 145 mm.), and in color differs so widely from the bright, handsomely spotted immature specimens hitherto known that its identity was not at first suspected. General color above a uniform brown, between the olive and bistre of Ridgway, faintly lightened by the irregular appearance at the surface of the color between the scales. Two dark longitudinal stripes on each side, the first on the fourth row of scales (spreading to third and fifth) the second on the eighth row (spreading to seventh and ninth); these stripes continuous from slightly behind head to base of tail. In color they are so faintly darker than the surrounding parts that in certain lights they are quite invisible. They are, nevertheless, sufficiently distinct to cause a strong resemblance to the color pattern of *Coluber quadrivittatus*. Belly olive yellow with the usual dusky blotches. The olive yellow extends over the back on the skin between the scales. Lips and entire space between rami pearly gray, thickly sprinkled with brown dots. At first sight the back appears to be quite unmarked, except for the longitudinal stripes, but on close inspection in a very favorable light faint traces of the rhombic spots may be detected, particularly on the tail and posterior half of body.—*Gerrit S. Miller, Jr.*

The generic name Coccystes untenable.

The Old World genus of cuckoos hitherto known as *Coccystes* Gloger (Handb. Naturg. Vög. Europ., 1834, p. 449) must in the future stand as *Clamator* Kaup, 1829 (Entwicklungs-Geschichte der Europäischen Thierwelt, p. 53), which antedates Gloger's name by five years. That Kaup's name is unimpeachable is clear from the following quotation of his remarks: "*Cuculus glandarius* . . . . scheint . . . gar nicht in die Gattung Kuckuk zu gehören, sondern eine eigene zu bilden, welche ich Strauszkuckuk *Clamator* nenne, und die durch die starken Fuszwurzeln und die Bildung der Nasenlöcher etc. sich characterisirt." The nine recognized species of this genus are then:

1. *Clamator glandarius* (Linnæus).
2. *Clamator coromandus* (Linnæus).
3. *Clamator jacobinus* (Boddaert).
4. *Clamator hypopinarius* (Cabanis and Heine).
5. *Clamator caroli* (Norman).
6. *Clamator brazzæ* (Oustalet).
7. *Clamator cafer* (Lichtenstein).
8. *Clamator serratus* (Sparrmann).
9. *Clamator albonotatus* (Shelley).—*Leonhard Stejneger.*

Gerrhonotus cæruleus versus Gerrhonotus burnettii.

Through the courtesy of Dr. G. Tornier, Curator of Reptiles in the Natural History Museum at Berlin, I have been enabled to examine the type of Wiegmann's *Gerrhonotus cæruleus* (Isis, 1828, p. 380). The specimen, though greatly blackened, is in good condition and proves to belong to the species which has hitherto been known as *Gerrhonotus burnettii* Gray 1831, or *Elgaria formosa* Baird and Girard 1852. The type locality is given as "Brasilien" and the collector as A. von Chamisso, the celebrated German poet and naturalist. Needless to say no *Gerrhonotus* occurs in Brazil, but as von Chamisso on his expedition around the world also collected at San Francisco, California, where this species is particularly plentiful, it may be regarded as certain that the type is from the latter locality. The number of the type specimen in the Berlin Museum is 1163.—*Leonhard Stejneger.*

Ptychozoon kuhli a new name for P. homalocephalum.

The remarkable gecko hitherto known as *Ptychozoon homalocephalum* requires a new name, inasmuch as Creveld's *Lacerta homalocephala* 1809 is preoccupied by *Lacerta homalocephala* Suckow 1798 (Naturgeschichte der Thiere, III, p. 138). As a suitable new name I propose *Ptychozoon kuhli* in memory of the originator of the generic name. It may be remarked that Gray's *Ptychozoon horsfieldii* is a very distinct species.—*Leonhard Stejneger.*

On the proper application of the name Cambarus carolinus Erichson.

In 1846, Erichson applied the name *Cambarus carolinus* to a species of crayfish which had been collected by Cabanis in western North Carolina. His description was very brief, and it was with some hesitation that Hagen, in 1870, applied the name to specimens from the same region which seemed to possess the characters ascribed by Erichson to the species. Erichson's type was at the time inaccessible to Hagen as it had been deposited in the Berlin Museum. A few years later he was able to examine this type and in a note made at the time expressed the view that Erichson's *C. carolinus* was the same as his (Hagen's) *C. bartonii.* In view of this doubt, Faxon, in his Revision of the Astacidæ, proposed the application of the name *C. hagenianus* to Hagen's species in case it should prove to differ from Erichson's *C. carolinus.*

Through the kindness of Dr. Thiele of the Berlin Museum I have recently been furnished with an excellent photograph of Erichson's type together with drawings of the first abdominal appendages and the right chela. They show that the species is neither *C. carolinus* Hagen nor *C. bartonii* Fabricius, but *C. dubius* Faxon. It will be necessary, therefore, to substitute in most of the writings on this subject *C. hagenianus* Faxon for *C. carolinus*, and *C. carolinus* Erichson for *C. dubius* Faxon.

The extension of the range is slight as *C. carolinus* Erich. (=*dubius* Fax.) has been collected in abundance in southwestern West Virginia, and adjacent portions of Virginia.—*W. P. Hay.*

Note on the names of the genera of Peccaries.

My attention has been called to the nomenclature of the Peccaries and my opinion asked. In my Arrangement of the Families of Mammals, in 1873, I adopted Gray's genera *Dicotyles* and *Notophorus*, having ascertained that the two groups were differentiated not only by their skulls, but also by the leg bones. Recently (Proc. Biol. Soc., Wash., XIV, p. 119, 1901), Dr. Merriam has also adopted the two genera, but uses Fischer's name *Tayassu* (1814) for the genus *Notophorus* of Gray and gives a new one (*Olidosus*) to the *Dicotyles* of Gray.

It seems to me that we can with propriety retain both names, *Tayassu* and *Dicotyles.* Dr. Merriam quite properly substitutes *Tayassu* for *Notophorus* as both the nominal species of Fischer (*pecari* and *patira*) belong to the genus to which the latter name was given.

The name *Dicotyles*, however, originally covered species of both genera and Gray was justified by general usage in restricting the name as he did, although he would have done better to have given a new name to the genus he called *Dicotyles* and retained the latter name for the one designated *Notophorus*.

We may now retain the time-honored names *Dicotyles* and *Dicotylidæ* and still adhere to rules of priority in the revival of the name *Tayassu*. —*Theo. Gill.*

The technical name of the Virginia Deer.

Dr. J. A. Allen* has recently proposed to change the technical name of the Virginia Deer from *Odocoileus americanus* to *Dama virginiana*, on the ground that the latter was used by Zimmermann† in correct nomenclatorial form many years before the proposal of *Odocoileus* by Rafinesque,‡ and in the same year as the publication of the specific name *americanus* by Erxleben.§ Zimmermann's terminology, however, is arranged with such disregard for the rules of binomial nomenclature that many of the names it includes are not entitled to recognition. A few instances will make this apparent. The genus *Canis* contains seven species designated as follows: 1. *Canis familiaris*, 2. *Canis lupus*, 3. *Hyena*, 4. *Hyena maculata*, 5. *Vulpes*, 6. *Lupus aureus*, 7. *Canis thous.* The first six species of *Viverra* are: 1. *Ichneumon*, 2. *Zibetha*, 3. *Genetta*, 4. *Fossana*, 5. *Putorius capensis*, 6. *Viverra tetradactyla.* Four of the species of *Lepus* are entered as follows: 3. *Lepus pusillus*, 4. *Cuniculus*, 5. *Cuniculus insigniter caudatus, coloris leporini*, 6. *Lepus capensis.* Under *Jerboa* we find: 1. *Mus jaculus*, 2. *Cuniculus pumilio saliens*, 3. *Mus longipes*, 4. *Yerboa*, 5. *Yerboa gigantea.* Finally as species of *Cervus:* 1. *Alce*, 2. *Tarandus*, 3. *Dama*, 4. *Cervus Elaphus*, 5. *Cervus Axis*, 6. *Cervus procinus*, 7. *Dama Virginiana*, 8. *Cervus Capreolus*, 9. *Cervus Pygargus*, 10, *Cervus* (vel potius) *Capreolus mexicanus*, 11. *Cervus camelopardalis.* It is obvious that such names as *Hyena*, *Lupus*, *Putorius*, *Cuniculus*, *Yerboa*, *Dama*, and *Capreolus* were not proposed as generic terms, and that they cannot be considered as valid even when by chance they were used for members of modern generic groups. Most of them appear in the index or on the map of geographic distribution, for Zimmermann was consistent in the application of his system, the main feature of which was, in Dr. Allen's own words (l. c., p. 13–14) "....to cite the names given by previous writers as these authors used them, regardless of whether the generic element of the name conformed or not with his own genera." He also made free use of Latinized vernacular names without attempting to harmonize them with his generic terminology. By no code of nomenclature can terms applied in this manner be construed as valid technical names. Therefore unless some more cogent reason can be shown for its abandonment the current name *Odocoileus americanus* should continue in use for the Virginia Deer.—*Gerrit S. Miller, Jr.*

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*Bull. Am. Mus. Nat. Hist., XVI, pp. 18–20, February 1, 1902.

†Specimen Zoologiæ Geographicæ, p. 532, also in index and on map, 1777.

‡Atlantic Journal, I, p. 109, Autumn of 1832.

§Syst. Regni Anim., I, p. 312, 1777.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWENTY NEW POCKET MICE (*HETEROMYS* AND *LIOMYS*) FROM MEXICO.

BY C. HART MERRIAM.

E. W. Nelson and E. A. Goldman, in the course of their field work in Mexico for the Biological Survey of the U. S. Department of Agriculture, have collected upwards of 800 specimens of Pocket Mice belonging to the old genus *Heteromys*. A preliminary study of this rich material has resulted in the division of the group into two genera, and in the discovery of a new subgenus and twenty apparently new species and subspecies. These are here described. I am indebted to my assistant, Mr. Goldman, for going over the material and arranging the very large series of specimens by localities, and roughly by species, before I undertook the study of the group.

Heteromys goldmani sp. nov.

Type from Chicharras, Chiapas, Mexico. No. 77,576 ♂ ad. U. S. National Museum, Biological Survey Collection. Collected Feb. 7, 1896 by E. W. Nelson and E. A. Goldman. Original No. 9244.

Characters.—Size very large; tail long and nearly naked, much longer than head and body; pelage coarsely hispid; sole of hind foot naked, 6-tuberculate.

Color.—Upperparts dusky gray, darkest on back and head; underparts, including upper lip, inner sides of fore and hind legs, fore and hind feet, white; tail dusky, in males only faintly paler below and with tip whitish; in females whitish below on basal ¾ and without white tip. Ears without white edges.

Cranial characters.—Skull large and massive; with well developed supraorbital beads and rather large irregularly oval interparietal; frontals broadened by supraorbital shelves; nasals truncate posteriorly on plane of premaxillæ.

Measurements.—Type specimen: total length 347; tail vertebræ 199; hind foot 40.

Heteromys goldmani lepturus subsp. nov.

Type from Mountains near Santo Domingo, Oaxaca, Mexico. No. 73,382 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected June 20, 1895 by E. W. Nelson and E. A. Goldman. Original No. 8120.

Characters.—Similar to *goldmani* but smaller and much less black, the head and back grizzled with fulvous, nose and ankles dusky by contrast; hind feet and tail decidedly shorter; rostrum broader, broadening gradually to zygomata with much less of the usual notch. Contrasted with *griseus* the animal is darker; skull heavier, broader, flatter, with more strongly developed supraorbital beads.

Measurements.—Type specimen: total length 340; tail vertebræ 191; hind foot 39.

Heteromys griseus sp. nov.

Type from Mountains near Tonala, Chiapas, Mexico. No. 76,062 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected August 15, 1895 by E. W. Nelson and E. A. Goleman. Original No. 8339.

Characters.—Size large but smaller than *goldmani;* tail much longer than head and body and nearly naked; general color grizzled grayish brown; sole of hind foot naked, 6-tuberculate.

Color.—Upperparts drab, grizzled on head and back with black-tipped hairs; underparts, upper lip and fore and hind feet white; ears without white edging; tail dusky above, whitish beneath except near tip which is dark all round; lateral line faint except on side of face where it appears as a broad pale buffy-fulvous band.

Cranial characters.—Skull long and rather heavy, similar in general to that of *goldmani* but slightly smaller and less massive, with narrower and more arched braincase, and with less extreme development of supraorbital ridges.

Measurements.—Type specimen: total length 325; tail vertebræ 186; hind foot 38.

Heteromys annectens sp. nov.

Type from Pluma, Oaxaca, Mexico. No. 71,510 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected March 18, 1895 by E. W. Nelson and E. A. Goldman. Original No. 7674.

Characters.—Size medium; tail long, slightly exceeding head and body; color dark; lateral line conspicuous; sole of hind foot hairy posteriorly, 6-tuberculate.

Color.—Upperparts blackish brown (nose, top of head and back mainly black; face and sides mainly brown, grizzled with black); lateral line bright fulvous, continuous from cheeks to thigh (in males continued on sides of scrotum); underparts and feet white, the hind feet sometimes clouded; tail indistinctly bicolor, dusky above, whitish beneath except terminal part which is dark all round.

Cranial characters.—Skull rather large and broad with rather spreading zygomata and narrow rostrum. In general similar to *gaumeri* but smaller, narrower interorbitally, with more abruptly spreading zygomata and smaller interparietal.

Measurements.—Type specimen: total length 300; tail vertebræ 165; hind foot 33.

Subgenus **Xylomys** nob.

Type, Heteromys (*Xylomys*) *nelsoni* sp. nov.

Pelage soft (without stiff bristles); inner side of foreleg (between wrist and elbow), and of hind leg, dark; skull light; braincase high and rounded; supraorbital beads small and faint; *upper surface of maxillary root of zygomata large, heavy and rectangular;* frontals much elongated, pushing nasals and premaxillæ far forward; under jaw broad, *without trace of tubercle over root of incisor*, and with angle very slightly everted. Dentition heavy. Posterior prism of last upper molar more or less completely double, the crown of the tooth presenting two complete transverse loops and a more or less perfect posterior loop.

Heteromys (Xylomys) nelsoni sp. nov.

Type from Pinabete, Chiapas, Mexico. No. 77,920 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected February 11, 1896 by E. W. Nelson and E. A. Goldman. Original No. 9281.

Characters.—Size very large; ears large; tail very long, much exceeding head and body and nearly naked; color grayish dusky; sole of hind foot naked, 6-tuberculate.

Color.—Upperparts, including fore and hind legs (except basal part of underside of foreleg and indistinct streak on hind leg), mouse gray, darkening to dusky on top of head and along middle of body; underparts including upper lip, fore feet, basal part of inner side of fore leg, and indistinct streak on inner side of hind leg, white; hind feet whitish, clouded above; tail dusky above, whitish beneath (except tip, which is dark all round); ears without whitish edges.

Cranial characters.—Skull long and slender, rather light, rounded on the sides, narrow across anterior roots of zygomata, with exceedingly faint supraorbital beads, small oval interparietal, no tubercle over root of lower incisor, and large teeth; rostrum long and slender; nasals truncate or slightly emarginate, ending on same plane with premaxillæ.

Measurements.—Type specimen: total length 356; tail vertebræ 195; hind foot 43.5.

Genus **Liomys** nob.

Type, Heteromys alleni Coues.

Characters.—Size medium or small; pelage hispid; tail rarely longer than head and body, well haired; skull murine in general appearance; angle of jaw strongly everted; molar crowns, above and below, consisting of two parallel transverse loops which with advancing age unite on one side (inner side on upper row, outerside on lower row) to form a horseshoe as in *Heteromys*, but without additional lobes or permanent enamel islands.

Liomys texensis sp. nov.

Type from Brownsville, Texas. No. 58,670 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected February 19, 1894 by J. Alden Loring. Original No. 1672.

Characters.—Size medium or rather small; general color coarsely grizzled reddish brown. Hind foot with 5 pads. Similar in general to *Liomys alleni*, but smaller, paler, redder, and much more coarsely grizzled.

Color.—Upperparts pale grayish brown or drab, coarsely grizzled with red and blackish hairs (the red predominating); underparts yellowish white; ears edged with whitish; hind feet and underside of tail white.

Cranial characters.—Skull similar in general to that of *alleni* but smaller and lighter, with much narrower rostrum (especially posteriorly) and smaller (short oval) interparietal.

Measurements.—Type specimen: total length 231; tail vertebræ 114; hind foot 30 [probably 32].

Liomys canus sp. nov.

Type from Parral, Chihuahua, Mexico. No. 96,259 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected Sept. 21, 1898 by E. W. Nelson and E. A. Goldman. Original No. 13,036.

Characters.—Size largest of the group; tail hairy; hind foot with 5 pads. Closely related to *alleni* but larger and grayer.

Color.—Upperparts gray, rather finely grizzled with a mixture of dark hairs, pale fulvous, and the white of the basal part of the hairs which shows through; lateral line absent or indistinct and confined to flanks; underparts and feet white; tail sharply bicolor; above blackish, below white except at tip which is dark all round; ears conspicuously edged and broadly tipped with whitish.

Cranial characters.—Skull large and massive, the frontal region broad and flat; parietal broadly oval; nasals truncate posteriorly. Similar in general to *alleni* but larger and heavier and very much broader between orbits.

Measurements.—Type: total length 276; tail vertebræ 138; hind foot 34.

Liomys torridus sp. nov.

Type from Cuicatlan, Oaxaca, Mexico. No. 69,645 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected October 14, 1894 by E. W. Nelson and E. A. Goldman. Original No. 6904.

Characters.—Size small; color gray; ears medium and only indistinctly edged with white; tail longer than head and body, bicolor, well haired; hind feet small (28 mm.). Hind foot with 5 pads. Contrasted with *Liomys albolimbatus* and *alleni* it is decidedly smaller, with much smaller hind feet, much less distinct ear edgings, and whitish forelegs [in both the others the forelegs are gray or dusky on outer side].

Color.—Upperparts gray, grizzled with black on top of head and back, forming a dark saddle on the gray; lateral line usually indistinct; underparts, forelegs, and fore and hind feet whitish; tail dark above, whitish below except at tip which is dark all round.

Cranial characters.—Skull small but rather heavy; zygomata rather broadly and squarely spreading; interparietal narrowly elongate-oval; nasals truncate or slightly emarginate. Easily distinguished from *albolimbatus*, which inhabits the same region, by its much smaller size, smaller teeth, and truncate nasals.

Measurements.—Type specimen: total length 242; tail vertebræ 134; hind foot 28.

Liomys torridus minor subsp. nov.

Type from Huajuapam, Oaxaca, Mexico. No. 70,301 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected November 18, 1894 by E. W. Nelson and E. A. Goldman. Original No. 7061.

Characters.—Similar to *torridus* but even smaller, with smaller ears, and shorter feet and tail; color more uniform grizzled gray, the back lacking the dark saddle; skull smaller; braincase more arched; interparietal more broadly oval; base of rostrum broader; bullæ smaller and more smoothly rounded.

Measurements.—Type specimen: total length 222; tail vertebræ 125; hind foot 27.

Liomys plantinarensis sp. nov.

Type from Plantinar, Jalisco, Mexico. $\frac{33595}{45630}$ ♀ ad., U. S. National Museum, Biological Survey Collection. Collected April 4, 1892 by E. A. Goldman. Original No. 2383.

Characters.—Size small—smallest of the *pictus* group; ears small; color reddish; tail lightly haired; hind foot with 5 pads.

Color.—Upperparts grizzled fulvous and blackish, the fulvous predominating except on the saddle, where they are about equally mixed; lateral line fulvous, broad and continuous from throat to thigh; underparts yellowish white; feet white; tail bicolor, drab above, whitish below; ears edged with whitish.

Cranial characters.—Skull smallest of the group [and in fact, of the known species of the genus] arched and rounded; nasals deeply notched posteriorly, ending essentially on same plane with premaxillæ; supraorbital bead faint; interparietal narrowly oval. Differs from *pictus* in much smaller size, notched instead of truncate nasals, narrow instead of broad interparietal, and smaller and more decurved rostrum and nasals.

Measurements.—Type specimen: total length 202; tail vertebræ 102; hind foot 26.

Liomys pictus rostratus subsp. nov.

Type from near Ometepec, Guerrero, Mexico. No. 71,488 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected February 14, 1895 by E. W. Nelson and E. A. Goldman. Original No. 7447.

Characters.—Similar to *pictus* but slightly larger; pelage coarser; color less red. Skull larger and heavier; rostrum and nasals decidedly longer; interparietal more oval; interorbital region broader; nasal endings either truncate or slightly notched.

Measurements.—Type specimen: total length 252; tail vertebræ 133; hind foot 29.

Liomys pictus isthmius subsp. nov.

Type from Tehuantepec, Mexico. No. 73,367 ♂, U. S. National Museum, Biological Survey Collection. Collected April 28, 1895 by E. W. Nelson and E. A. Goldman. Original No. 7796.

Characters.—Similar to *pictus*, from which it differs in color, the upperparts being very much paler, much less red, the lateral line absent or faint; the dark nose patch obsolete. The differences are marked when the animals are turned on their sides, the bright fulvous cheeks of *pictus* contrasting strongly with the pale grayish brown cheeks of *isthmius*. The skull is slightly smaller, with narrower rostrum and more evident supraorbital bead.

Measurements.—Type: total length 245; tail vertebræ 130; hind foot 30.

Liomys sonorana sp. nov.

Type from Alamos, Sonora, Mexico. No. 96,252 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected December 19, 1898 by E. A. Goldman. Original No. 13,299.

Characters.—Size medium or rather large; pelage strongly hispid; tail hairy; general color harshly grizzled grayish brown; hind foot with 6 pads. Size, color, and general external appearance much as in *Liomys alleni*, but cranially different, and foot pads 6 instead of 5.

Color.—Upperparts grayish drab, coarsely grizzled with fulvous and dark hairs; underparts yellowish white; lateral line fulvous, distinct from under eye to thigh; ears lightly edged with white; feet white, band across end of nose and base of whiskers brownish; tail above dusky, below whitish on basal ⅔, becoming dusky on terminal third.

Cranial characters.—Skull rather large, decidedly heavier than that of *pictus;* rostrum long and slender with parallel sides; nasals long, deeply emarginate posteriorly; interparietal roughly oval. Compared with *Liomys pictus* the skull and teeth are larger and heavier; braincase higher; rostrum longer; nasals longer and deeply notched (instead of truncate or faintly emarginate); anterior roots of zygomata heavier and stronger.

Measurements.—Type specimen: total length 262; tail vertebræ 142; hind foot 32.5.

Liomys veræcrucis sp. nov.

Type from San Andreas Tuxtla, Vera Cruz, Mexico. No. 65,457 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected May 7, 1894 by E. W. Nelson and E. A. Goldman. Original No. 6174.

Characters.—Size medium; tail scantily haired; hind foot with 6 pads; color dark.

Color.—Upperparts dark brown, strongly grizzled with black-tipped bristles and intermixed irregularly on head and shoulders with soft fulvous hairs; lateral line most evident on sides of face, faint or absent on sides of body; nose and ankles dusky; ears not appreciably edged with whitish, except near inferior base; tail bicolor, dusky above, whitish beneath.

Cranial characters.—Skull small and smoothly rounded; frontals anteriorly, and base of rostrum rounded off on side; upper surface of anterior root of zygomata strongly depressed and rounded; nasals notched posteriorly, decurved anteriorly; interparietal sub-triangular. Skull similar in general to that of *pictus*—of which it may prove a subspecies—but braincase higher and more arched; frontals narrower between orbits; rostrum (particularly premaxillæ) broader; zygomata more outstanding, with anterior root heavier and broader.

Measurements.—Type specimen: total length 220; tail vertebræ 108; hind foot 25.

Liomys obscurus sp. nov.

Type from Carrizal, Vera Cruz, Mexico. No. 108,563 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected May 12, 1901, by E. W. Nelson and E. A. Goldman. Original No. 14,714.

Characters.—Size (particularly hind foot) rather large for the *pictus* group (to which it belongs); pelage hispid; color blackish; lateral line conspicuous; tail bicolor; hind foot with 6 pads.

Color.—Upperparts mainly blackish, becoming grayish on sides, and grizzled slightly with fulvous and much more with whitish (due to the showing through of the light basal part of the hairs).

Cranial characters.—Skull clearly of the *pictus* type but differing from *pictus* in being slightly heavier and in having the braincase higher, the rostrum and nasals a little longer; nasal endings truncate or emarginate. Compared with its geographic neighbor, *veræcrucis*, the skull as a whole, but particularly the rostrum, is longer and narrower, the rostrum less decurved, anterior root of zygomata lighter.

Measurements.—Type specimen: total length 230; tail vertebræ 124; hind foot 31.

Liomys phæura sp. nov.

Type from Pinotepa, Oaxaca, Mexico. No. 71,500 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected February 21, 1895 by E. W. Nelson and E. A. Goldman. Original No. 7553.

Characters.—Size small; ears rather large; hind foot with 6 pads; tail short and dark all round except under side near base; color grizzled drab brown; skull broad and short.

Color.—Upperparts drab brown grizzled with black and pale fulvous; underparts yellowish white; lateral line fulvous, reaching from in front of eye to thigh; ears faintly edged with whitish; nose and ankles dusky; feet white; tail dusky all round except basal third of under side which is pale, without line of demarcation.

Cranial characters.—Skull broad, short and flat; rostrum and nasals short and slender; braincase and frontals broad: interparietal subtriangular and rather small; zygomata squarely spreading.

Measurements.—Type specimen: total length 204; tail vertebræ 95 [extreme tip gone]; hind foot 29.

Liomys orbitalis sp. nov.

Type from Catemaco, Vera Cruz, Mexico. No. 65,452 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected April 29, 1894 by E. W. Nelson and E. A. Goldman. Original No. 6129.

Characters.—Size medium; pelage strongly hispid; tail slightly shorter than head and body, sparsely haired; hind foot with 6 pads. Skull broad and heavy, peculiar.

Color.—Upperparts dark brown, blackish on saddle, with only very slight grizzling of fulvous; lateral line narrow or indistinct; underparts and feet white; nose and ankles dusky; tail dusky above, whitish beneath except near tip which is dark all round.

Cranial characters.—Skull very broad, much more massive than in *pictus* series; nasals slightly emarginate posteriorly, rather broad, their sides parallel on posterior half, then suddenly expanding; *zygomata heavy and much more widely and squarely spreading* than in any other species; interorbital region and base of rostrum flat; interparietal nearly oval; rostrum rather short, with parallel sides; superciliary beads more strongly developed than usual, and reaching back to middle of parietals.

Measurements.—Type specimen: total length 225; tail vertebræ 109; hind foot 29.

Liomys crispus sp. nov.

Type from Tonala, Chiapas, Mexico. No. 75,105 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected August 7, 1895 by E. W. Nelson and E. A. Goldman. Original No. 8283.

Characters.—Appearance strikingly different from all known members of the genus; size small; tail decidedly shorter than head and body and scantily haired, the scales evident; hind foot with 6 pads; color gray, sprinkled with hoary hairs *with recurved tips.*

Color.—Upperparts gray, darkest along middle of back and everywhere sprinkled with slender whitish-tipped hairs which stand out or have the tips recurved, giving the animal a unique appearance; underparts and feet whitish; no trace of lateral line; ears not edged with whitish; tail pale dusky, palest (sometimes whitish) beneath but without line of demarcation.

Cranial characters.—Skull mouse-like, with exceedingly faint supraorbital beads, large roughly oval interparietal, rather broad nasals with parallel sides, squarely truncate behind on same plane with premaxillæ.

Measurements.—Type specimen: total length 210; tail vertebræ [extreme tip gone] 99; hind foot 27.5.

Liomys crispus setosus subsp. nov.

Type from Huehuetan, Chiapas, Mexico. No. 77,588 ♀ old., U. S. National Museum, Biological Survey Collection. Collected February 22, 1896 by E. W. Nelson and E. A. Goldman. Original No. 9364.

Characters.—Similar to *crispus* but pelage much coarser and more hispid; color darker; recurved pale-tipped hairs less abundant; tail averaging longer; skull larger and more massive; supraorbital beads more strongly developed; nasals more cuneate (sides less parallel), less squarely truncate posteriorly, and ending anterior to premaxillæ. May prove a distinct species.

Measurements.—Type specimen: total length 225; tail vertebræ 110; hind foot 29.

Liomys heterothrix sp. nov.

Type from San Pedro Sula, Honduras. No. 90,161 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected July 16, 1897 by J. C. Ingersoll. Original No. 20 (884x).

Characters.—Size medium, a little larger than *L. crispus setosus*, its nearest known relative; tail nearly naked, about equaling head and body; color grizzled brownish, the blackish dorsal bristles overlaid by slender protruding hairs with recurved rusty tips; ears without edging; hind foot with 6 pads.

Color.—Upperparts dark drab brown, grizzled with black-tipped bristles and much more conspicuously with slender ferruginous-tipped hairs which protrude beyond the other hairs and are more or less recurved; underparts and feet yellowish white; tail dark, indistinctly paler below.

Cranial characters.—Skull similar to that of *L. crispus setosus* from Huehuetan, Chiapas, but somewhat larger and heavier, and broader across anterior roots of zygomata.

Measurements.—Type specimen: total length 255; tail vertebræ 126; hind foot 31.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW PIG FROM SUMATRA.*

BY GERRIT S. MILLER, JR.

Among some mammals collected by Dr. W. L. Abbott on the Indragiri River, eastern Sumatra, during September, 1901, and presented to the United States National Museum, is an adult male of the Nang-oi, a large pig related to the Bornean *Sus barbatus* Müller and *Sus longirostris* Nehring. It is readily distinguishable from the species of *Sus* hitherto described, and may be known as:

Sus oi sp. nov.

Type.—Adult male (skin and skull) No. 113,150 United States National Museum. Collected on banks of the Indragiri River (about 30 miles above mouth) eastern Sumatra, September 20, 1901, by Dr. W. L. Abbott. Original number 1319.

Characters.—Externally most like *Sus barbatus*, but with body even more scantily haired (there is no mane and the skin is nowhere concealed by the bristles except on the face), and two well-developed warty protuberances on muzzle. Skull essentially as in *Sus longirostris*. Teeth smaller than in *Sus longirostris* or *S. barbatus*, the posterior lower molar greatly reduced in size, much as in *Sus celebensis*.

External features.—The body and neck are sparsely and uniformly sprinkled with black bristles which nowhere conceal the yellowish white skin. On sides and belly they are very stiff, closely appressed and directed backward, about 20 mm. in length and nearly .5 mm. in diameter. On legs they are less coarse in texture and sufficiently numerous to produce a distinct dark shade. Along middle of neck and back they increase in length to about 50 mm., the diameter at the same time decreasing to .3 mm. The hairs form no mane, but throughout the region where it occurs in other hogs the hairs are less scattered and appressed than elsewhere. They are black, tipped with yellowish brown. Head as in *Sus barbatus*[*], except that about midway between eye and muzzle there are two well-developed protuberances 30 mm. in length and 20 mm. in breadth densely covered with stiff antrorse bristles. These bristles as well as those of the upper part of the face are uniformly yellowish brown. On cheeks they are strongly intermixed with black. Tail scantily covered with stiff black hairs about 25 mm. in length. They nowhere conceal the skin, but on terminal third are sufficiently close-set along sides to form a distinct flattened brush.

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Skull.—The skull so closely resembles that of an adult male *Sus longirostris* from Borneo that it might readily be supposed to belong to an individual of the same species.

Teeth.—The teeth, with the exception of the canines, are uniformly smaller and narrower than those of *Sus longirostris.* Upper incisors wide apart, the second separated from both first and third by a space of 15 mm. (in *S. longirostris* the distance between second and first is 5 mm., that between second and third only 2 mm.). Posterior upper molar with last tubercle less than half as large as in the corresponding tooth of *S. longirostris.* Third lower molar consisting of only two cross ridges and a terminal heel, the entire length of the tooth much less than that of the two preceding teeth combined. In form it closely resembles Nehring's figure of the same tooth in *Sus celebensis*[†] and is very different from that of *Sus longirostris* and *Sus cristatus.*[‡]

Measurements.—External measurements of type: total length, 1870; head and body, 1575; tail, 295; height at shoulder, 850; height at rump, 800; ear from meatus, 88; ear from crown, 97; width of ear, 75. Weight 113 kg. Cranial measurements of type: greatest length, 480 (465)[§]; basal length, 405 (390); basilar length (to tip of premaxillary), 410 (397); palatal length to tip of premaxillary, 330 (—); width of palate at pm. $\frac{1}{}$, 50 (45); zygomatic breadth, 162 (148); least interorbital breadth 80 (76); length of nasals, 240 (230); greatest breadth of both nasals together, 38 (38); occipital depth (to lower rim of foramen magnum), 140 (140).

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[*] See plate xxx, of Verhandel. over de Natuurlijke Geschiedenis der Nederl. overzeesche bezittingen.

[†] Abhandl. u. Berichte des K. zoologisch. u. anthrop.-ethnol. Mus. zu Dresden, 1888–1889, pl. ii, fig. 8.

[‡] In *Sus barbatus,* this tooth is, according to Nehring, of the usual form, that is with three cross ridges and a terminal heel.

[§] Measurements in parenthesis are these of an adult male *Sus longirostris.*

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SOME RECENT CHANGES IN THE NOMENCLATURE OF WEST INDIAN CORALS.

BY T. WAYLAND VAUGHAN.

The nomenclature of the West Indian stony corals has for many years been what may best be called traditional. Between the times of the publication of the last volume of Milne Edwards and Haime's great work "Histoire Naturelle des Coralliares" in 1860, and Brook's Catalogue of the species of the Genus Madrepora* there were only slight changes. Brook proposed one change of considerable moment in uniting the various species of *Madrepora* (Lamarck) from the West Indies under one specific name, *muricata* of Linnaeus. Gregory in his "Contribution to the Geology and Physical Geography of the West Indies"† proposed other changes.

When I took up the study of these corals, I soon saw that the nomenclature was in great confusion, many names not being supported by the simpler rules of nomenclature now universally accepted. In two papers, "Some Fossil Corals from the Elevated Reefs of Curaçao, Arube and Bonaire",‡ and "The Stony

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*Catalogue of Madreporarian Corals in the British Museum (Natural History), Vol. I, Genus Madrepora, 1893.

†Quart. Jour. Geol. Soc. of Lond., LI, pp. 255–310, pl. xi, 1895.

‡Samml. Geologisch. Reichs-Museum, Leiden. Ser. II, Bd. II, Heft I, pp. 1–91, June, 1901.

Corals of the Porto Rican Waters",* I attempted to determine the proper names so far as the material included in those reports seemed to justify, and made many changes. Prof. A. E. Verrill has written an extremely valuable paper, "Variations and Nomenclature of Bermudian, West Indian, and Brazilian Reef Corals, with Notes on Various Indo-Pacific Corals",† now appearing, treating of the same subject. In this paper some additional changes are made. In the paper just mentioned and in a review of my "Stony Corals of the Porto Rican Waters",‡ Prof. Verrill has given reasons for dissenting from some of the conclusions reached by myself, and as we had had an extended correspondence concerning the differences between us, he inserted a foot-note stating wherein I agreed with him after further consideration.

Too many changes have been made in the nomenclature for all of them to be reviewed here, but as it seems desirable that the following additional data, largely of a bibliographic nature, be laid before the students of stony corals the following notes have been prepared. The names discussed are those used by Prof. Verrill in his memoir cited above and in his review of my Porto Rican corals in place of the ones used by myself. In tabulating the following notes the name employed by Prof. Verrill is placed first, *versus* the one employed by myself, which is placed second. Five cases are discussed, in three of which Prof. Verrill and I agree, but in the remaining two we still hold different opinions.

1. *Acropora*, Oken, 1815, versus *Isopora*, Studer, 1878. I overlooked the availability of Oken's *Acropora*, for the Lamarckian, not Linnean, *Madrepora*. Prof. Verrill is correct, *Acropora* is the proper generic name.

2. *Maeandra*, 1815, versus *Platygyra*, 1834, *Manicina* (*areolata* as type), 1834, and *Diploria*, 1848. I selected as the type of *Maeandra* the species figured by Oken, the *maeandrites* of

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*U. S. Fish Commission, Bulletin for 1900, II, pp. 289–320, pls. i to xxxviii, Dec. 13, 1901.

†Trans. Conn. Acad. Sci., XI, pp. 63–160 [my copy dated by Prof. Verrill, Dec. 14, 1901], pp. 161–168 [not published on Jan. 15, 1902. I have advance proof kindly sent me by Prof. Verrill], plates x–xxxv [not published Jan. 15, 1902]. Prof. Verrill sends me the completed memoir, dated by himself Jan. 22. 1902.

‡Am. Jour. Sci. 4th Ser., XIII, pp. 75–78, January, 1902.

Linnaeus. In this I must admit having committed an error, as Ehrenberg, 1834, restricted *Maeandra*, dividing it into two subgenera *Platygyra* and *Dendrogyra.* Only one of Oken's original species, the *labyrinthica*, from the Red Sea, was included under *Maeandra*, and that in the subgenus Platygyra, thus making the Red Sea form the genotype, and causing *Platygyra* to be a synonym of *Maeandra.* There is sometimes apparent disagreement between Prof. Verrill and myself where there is in reality agreement. I had clearly recognized the extremely close relationship of *Diploria*, *Manicina* (auct.) and *Maeandrina* M. Edw. & H. (non Lamarck, 1801) and had thought of combining them as one genus, especially *Diploria* and *Manicina* (auct.), but did not consider the data at my disposal quite sufficient to warrant such action; but, probably, I would have united them in my next publication, as Prof. Verrill has done.

3. *Maeandra cerebrum* (Ellis & Solander, 1786) versus *Maeandra viridus* (LeS., 1820). I discarded the *Madrepora cerebrum* of Ellis and Solander as being unidentifiable, particularly as no locality is given. If the West Indies had been named as the locality, I would be strongly inclined to adopt the name, as the description is almost the same as that of *Madrepora labyrinthica*, which is from the West Indies (the latter name is peroccupied, Pallas, 1766, and is not available). As Ellis and Solander had given a name to the West Indian species, it seems probable that the other species may have come from another locality, for instance, the Red Sea. I do not see how a valid argument as to what was meant could be drawn from the use of the specific name *cerebrum*, because Ellis and Solander may have given the name of themselves, or natives, of other parts of the world may call similar coral "brainstone". In my opinion the evidence is not sufficient for the identification of *cerebrum.*

Concerning *viridis* LeSueur, described as a variety of *Meandrina sinuosa?* Ellis & Sol., I remark that it is easy to identify LeSueur's *sinuosa* (not of Ellis & Solander). LeSueur divided the species, chiefly on the basis of color, into varieties, which he himself evidently did not consider of specific value. The possible species from his descriptions, are limited to two, the one that I claim he meant, and *clivosa* of Ellis and Solander.

The latter species is chacterized by having nodules over its surface, and as LeSueur was an acute observer he could reasonably be expected to have noticed them unless his specimens were very young, but he says nothing from which one would draw such an inference. But in addition to the descriptions, figures are given by LeSueur and these are characteristic of the species that I insist he meant,* and according to my experience of no other. Figure 5*b* is a cross-section of three collines. I have examined specimens of *clivosa* but found no such collines, whereas they are characteristic of a common variety of what I am calling *viridis.*† I see no room for doubting the correctness of my identification. Prof. Verrill in the review has not considered that LeSueur attached the name *viridis* in a varietal sense to a species, and has neglected to make remarks on the figures. I did not use the green color as an aid in identification, in fact I have never alluded to the color of corals in any paper that I have published.

4. *Orbicella annularis* (Ell. & Sol.) versus *O. acropora*, (Linn.). I used Esper's work in identifying the *acropora* of Linnæus. Esper's figure is good, and he states that "Sie kommen aus den südlichen amerikanischen Meeren". But as Ellis and Solander had in the interval between Linnaeus and Esper given a definite name to the species, I admit that it is better to use *annularis* Ell. & Sol., instead of *acropora* Linn. (Esper).

5. *Porites polymorpha* Link, 1807, versus *P. porites* (Pallas, 1766).

The *Madrepora porites* of Pallas, as all admit, included several species. Prof. Verrill states that Esper eliminated *M. conglomerata* and *M. arenosa*, but he does not give the use made by that author of *Madrepora porites.* I regret that I did not publish the full synonymy of the species, for that would have shown that the name can be applied only as I have used it, or even in a more restricted sense. The *Madrepora porites* Esper pl. xxi, is what I have called *Porites porites.* However Ellis and Solander, 1786, figured *Madrepora porites*, the *clavaria* of Lamarck, and restricted the name to a particular *forma* of the West Indian branching *Porites* even before Esper. The references given by Pallas show that he included the West Indian species.

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*Mem. Mus. Hist. Nat. Paris, VI, p. 279, 1820.

†Attention is especially directed to pl. xiv, figs. 2 and 5, also pl. xii, fig. 4, of the memoir of Prof. Verrill, previously cited. Pl. xiv, fig. 2 represents a variety of *clivosa*, the other figures *viridis* (*cerebrum* Verrill).

The following synonymy will give a history of the restriction of the name

Porites porites (Pallas).

1756. *Corallium, poris stellatis,* etc. Seba, Thesaurus, CXI, p. 202, pl. cix, fig. 11 (referred to by Pallas and subsequent authors), 1756.

1766. *Madrepora porites* (pars) Pallas, Elench. Zooph., p. 324, 1766.

1767. *Madrepora porites* (pars) Linnaeus, Syst. Nat., ed. XII, p. 1279, 1767.

1786. *Madrepora porites* Ellis & Solander, Nat. Hist. Zooph., p. 172, pl. xlvii, fig. 2, 1786.

1790. *Madrepora porites* (pars) Gmelin, Linn. Syst. Nat. Ed. XIII, p. 3774, 1790.

1791. *Madrepora porites* Esper, Pflanzenth, Th. I, p. 133, Madr. pl. xxi, 1791.

1807. *Porites polymorphus* (pars) Link, Beschreib, Natur, Samml. Rostock, p. 163, 1807.

1816. *Porites clavaria* Lamarck, Hist. Nat. Anim. sans. Vert., II, p. 270, 1816.

1901. *Porites porites* Vaughan, Samml. Geol. Reichs-Mus. Leiden, 2nd Ser. II, p. 73, 1901.

1901. *Porites porites* Vaughan, Bull. U. S. Fish Comm. for 1900, II, pp. 314–316, pls. xxviii–xxxi, 1901.

1901. *Porites polymorpha* Verrill, Trans. Conn. Acad. Sci., XI, p. 158 (pl. xxxi, figs. 3, 3a, not yet published), 1901.

1901. *Porites polymorpha* Verrill, Am. Jour. Sci., 4th Ser. XIII, p. 77, 1901.

Linnaeus in the twelfth edition of his Systema Naturae (1767) described the species as "*M*[*adrepora*] *subramosa composita* *scabra, poris substellatis confertis,*" thus limiting the name to the branching forms, and eliminating such species as *Porites astreoides* and *Rhodaræa calycularis.* Ellis and Solander, 1786, figured typical *clavaria* under the name *Madrepora porites*, describing it as "*Madrepora ramulosa, ramis clavato-complanatis, stellis contiguis* (*lamellarum loco*) *cuspidato-tuberculatis.*" This completely restricts the specific name *porites.*

Link (1807) used *polymorphus* for *Madrepora porites*, Gmel., Syst. Nat. ed. XIII, p. 3774; Esper, Th. 1, *Madrepora*, pl. xxi; and *Madrepora damicornis*, Gmel., Syst. Nat. ed. XIII, p. 3775; Esper, Th. I, *Madrepora* pl. xlvi. His only specific description is contained in the words "Vielgestalte *P*[*orites*]." He confused two species, and I do not see how his name can be used at all for any species as it is a renaming of *Madrepora porites*, as used by Linnaeus, *damicornis.* The name is not proposed for a part of *porites.* As shown above, the name *porites* had been definitely restricted twenty-one years previously by Ellis and Solander.

Lamarck (1816) describes *Porites clavaria* in words quite similar to those of Ellis and Solander. To illustrate his species, he refers to pl. xlvii, fig. 1, of Ellis and Solander and Vol. I, pl. xxi, of Esper, each figure being designated *Madrepora porites* by the respective author of the work in which it was published. Ellis and Solander confused nothing else with their one species, therefore *Porites clavaria* of Lamarck is a precise synonym of *Madrepora porites* Pallas, restricted by Ellis and Solander.

Considering the extremely complex synonymies with which we have had to deal and the great difficulties encountered in the material itself in studying corals, it is extremely gratifying to me that the differences between Prof. Verrill and myself are so slight, being comparatively trivial. The paper by Prof. Verrill, to which both he and I have referred, is an admirable contribution to our knowledge of corals. I find in it very little from which I dissent; in actual ideas we are in agreement almost completely.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A FURTHER NOTE ON THE GENERIC NAMES OF THE MEPHITINÆ.

BY J. A. ALLEN.

A few months ago Mr. Arthur H. Howell, in his 'Revision of the Skunks of the Genus *Chincha*,'* proposed to substitute the name *Chincha* Lesson, 1842, for the group of Skunks which had previously for a century been known as *Mephitis* Cuvier (1800), and to transfer the name *Mephitis* to the group which for thirty-six years had been known as *Spilogale* (Gray, 1865). The basis for this transfer seeming to me invalid, I soon after gave my reasons for this belief in a paper entitled 'The Generic Names of the Mephitinæ.'† Mr. Howell, in a recent article entitled 'The Generic Names of North American Skunks,'‡ endeavors to justify his action in regard to the case of *Chincha*, and also in reference to several minor points respecting which we hold different opinions. Fortunately, or unfortunately, these disputed points nearly all hinge on a wretched plate published by Catesby in 1731, and an equally inaccurate and vague description of an animal he called *Putorius americanus striatus,* which became in 1758 the chief basis of Linnæus's *Viverra putorius.* This name, with a quasi-fictitous basis, as has been recognized by all modern writers on the Skunks, having been introduced into systematic literature naturally held its place in the writings of a long list of later indiscriminate compilers, but which has been almost as uniformily rejected by more critical students as having no justifiable basis.

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*North American Fauna, No. 20, August 31, 1901.

†Bull. Am. Mus. Nat. Hist., XIV, pp. 325–334, Nov. 12, 1901.

‡Proc. Biol. Soc. Washington, XV, pp. 1–9, with a plate, Feb. 18, 1902.

As Catesby's description and plate, and more especially the latter, are the basis of the present controversy it may be well to compare, in parallel columns, Mr. Howell's opinion and mine as to how such a gross caricature of nature could have originated.

ALLEN, *Nov. 1901.*	HOWELL, *Feb. 1902.*
"As stated by Bangs......, it [Catesby's *Putorius americanus striatus*] is composite, being apparently 'a combination of *Mephitis mephitica* and *Spilogale ringens.*' Catesby's figure, however, has little resemblance to either, and may fairly be considered as drawn offhand from a confused recollection of these two animals, and hence factitious. (*L. c.*, p. 326, 327.) "......they [Catesby's figure and description] must have been based, to take the most charitable view of the case, on a confused recollection of the little spotted skunk and the common skunk, and not on any animal he ever met with in nature." (*L. c.*, p. 333.)	"Although neither the figure nor the description furnishes an accurate portrayal of either of the two skunks inhabiting the region where he [Catesby] travelled, the reference of both plate and description to *Spilogale* seems unquestionable......" (*L. c.*, p. 3.) "When we consider that Catesby's drawing was probably made from his recollection of an animal seen afield, perhaps at some distance, and probably in the dusk of twilight, the differences between the figure and the real animal become unimportant. It must be remembered that it is not necessary to show that his figure is a correct representation of a *Spilogale:* the question is simply, could it have been based on anything else?...." (*L. c.*, pp. 3 and 4.)

As shown above, Mr. Howell admits that Catesby's figure and description do not "accurately" portray either of the two skunks of North Carolina, and that the "drawing was probably made from his [Catesby's] recollection of an animal seen afield perhaps at some distance, and probably in the dusk of evening;" which is equivalent to my statement that the drawing was made off-hand from a confused recollection of the two animals. Thus far Mr. Howell's opinion and estimate of the value of Catesby's description and figure are in perfect agreement with my own. But he assumes, nevertheless, that both "*unquestionably*" relate to *Spilogale*, and on this assumption, as already said, his contention and conclusions solely rest; while I claim that they represent nothing in nature and that any names based on them by later systematists have no standing in nomenclature and should be treated as though they had no existence. This leaves Cuvier's genus *Mephitis*, as originally constituted, a monotypic group, unless we admit Kalm's description of his Pennsylvania skunk as affording a basis for a second species, in which case the two species admitted by Cuvier are strictly congeneric, the genus containing no element of *Spilogale* or *Conepatus*, and hence is not open to restriction.

Mr. Howell has made a most welcome and valuable contribution to the controversy by illustrating his paper with a reduced copy of Catesby's figure, and giving with it, on the same plate for comparison, illustrations of typical examples of *Mephitis* and *Spilogale* from the region in question. Catesby's animal, with five long, narrow, white stripes running the entire length of the body and one of them continued far down on the tail, and its otherwise wholly black tail, as long as the body, broad, bushy, and without a white tip, and the two light stripes on the head, is sufficiently in contrast with either form of the skunk to warrant both Mr. Howell's and my own statement that it is essentially a figment of Catesby's imagination or a fabrication based on a treacherous memory. It was deserving of serious consideration only in the early days of zoology, during the middle and latter part of the eighteenth century, when traveller's tales and the crude observations of unscientific writers formed the basis, in lieu of specimens, of so many of the 'species' of the early systematists. Their work, done in good faith and with the laudable intent of systematizing the supposed natural history information of that day, proves a most perplexing legacy to modern zoologists, who have the task of separating fiction and error from the truth, and of saving, wherever possible, by due restriction, the names bestowed by the fathers of zoology upon composite species.

But to return to the case of Catesby's *Putorius americanus striatus.* Mr. Howell says: "The question is simply, could it have been based on anything else [than *Spilogale*]?" This question I have already answered in the negative by saying it "must have been based, to take the most charitable view of the case, on a confused recollection of the little spotted skunk and the common skunk;" or, as Mr. Howell quite as well puts it, on "his recollection of an animal seen afield, perhaps at some distance, and probably in the dusk of twilight." Is this a legitimate basis for the overturning of two properly founded and long-accepted genera, and for the introduction of corresponding changes in the names of some forty to fifty species and subspecies? Really the drawing, taken all in all, quite as well fits the common skunk as the spotted skunk; *five* white stripes, some of them running from the nose to the base of the tail and one of them continued over the basal third of the tail, do not very strongly suggest *four* white stripes limited to the front half of the body, succeeded on the posterior half by a series of interrupted *transverse* white stripes, nor does the very long broad wholly black tail (except for the basal stripe) suggest the long white tail tip of either skunk. But why should we particularize when there is scarcely a color marking on Catesby's animal that is like any marking on any known skunk. Its being a black animal with longitudinal white stripes is all there is about it that suggests any form of skunk. If the ground color had not been described as black, and the figure had been labelled Striped Ground Squirrel, it could quite as well have been accepted as a *Tamias* as a *Spilogale* or a *Mephitis.*

Here is certainly a case for the application of Canon XLIV of the A. O. U. Code of Nomenclature, which reads: "In determining the pertinence of a description or figure on which a genus, species, or subspecies may respectively rest, the consideration of pertinency is to be restricted to the species scientifically known at the time of the publication of the description or figure in question, or to contemporaneous literature." In the present case, of course, the description or name in question is Linnæus's *Viverra putorius.* And at this late day when the fauna of Catesby's region is well-known, Mr. Howell asks us, What else can Catesby's figure represent if it is not a *Spilogale?* —at the same time admitting that it does not represent any known animal.

It is a pity to waste so much ink and paper over nomenclatural details, but there are a few other points in Mr. Howell's ingenious effort to make black pass for white, and *vice versa,* to which attention should be called. He says, for instance: "The name *Mephitis putorius*, based on Catesby's species, was first used by Dr. Coues, who applied it in a broad sense to all the little spotted skunks of North America. Some years later, the name was definitely fixed by Dr. Merriam to the Florida species. Its use by these two authors would seem to be sufficient to establish the name on a firm basis. The only way in which it can now be overthrown is to show beyond question that it cannot possibly apply to a *Spilogale*, which has not been done." To take up the last point first, if it had not been done before Mr. Howell wrote his last paper on the *Chincha* case, this paper, with his admirable plate of comparative figures, and his own admissions, have most effectually accomplished it.

As Dr. Coues was the first to revive *Viverra putorius* (as he was to revive many other untenable names), how about the action of previous authors, those who, like Dr. Coues, were investigators and not mere compilers, who repudiated the name, as, for example, Gray, Lichtenstein, Wagner, and many others, not to mention those who ignored it as simply uncitable, as Baird, among many others. As early as 1838 Lichtenstein went into the matter at length and rejected the name as unworthy of series consideration. Even Coues*, in speaking of *Viverra putorius* Linn., says: "Diagnosis agrees sufficiently with *Spilogale;*" but adds, "general bearing rather upon *Mephitis mephitica.*" But the context shows that he was referring to Linnæus and not to Catesby, Linnæus's diagnosis being "V. fusca lineis quatuor albidis dorsalibus parallelis;" so that, by a slip, or otherwise, Linnæus gave *four* white stripes and not *five.* His diagnosis thus does not agree with Catesby's description and figure; yet, as Coues says, it was "based primarily upon *Putorius americanus striatus* Catesby." The only other author Linnæus cited under this name in 1758 was Kalm, whose account of the external characters of the Pennsylvania skunk is a paraphrase of Catesby's. This slip of Linnæus's in paraphrasing Catesby would of course greatly help the case for *Spilogale* were it not that there is no other source than Catesby as the basis for his diagnosis. Coues was evidently influenced by this error in accepting *putorius*, as he refers repeatedly in his discussion of the matter to the "four stripes" mentioned by Linnæus, while it is not at all evident that he actually consulted Catesby in this immediate connection.

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*Fur-bearing Animals, 1877, in the synonomy at the beginning of page 239.

As said in my former paper, the two Linnæan skunk names, *Viverra memphitis* and *V. putorius*, are both equally uncitable, and, aside from perfunctory compilers, were so treated by all scientific writers prior to Coues's attempted revival of *putorius* in 1875.

Mr. Howell says (p. 6), that the question of the type of *Mephitis* was not affected by the revisions of the genus by Gray (1837) and Lichtenstein (1838), because they simply removed from the group to new genera species which had been placed under *Mephitis* by later authors. Mr. Howell thus fails to grasp the fact that these removals were in effect a restriction of the genus *Mephitis* to its original components, and that therefore Lesson, in 1842, could not substitute a new genus *Chincha* for the old and already repeatedly restricted genus *Mephitis*. Nor does he seem to recognize the impropriety of his attempt to enforce this substitution, and his own transference of *Mephitis* to the *Spilogale* group, on the basis of a nominal species rejected as having no proper foundation by all investigators of the matter down to Coues, who was influenced, as already shown, by Linnæus's evident lapsus in writing *quatuor* where he should have written *quinque*, and not by the real character of Catesby's description and figure on which Linnæus's diagnosis must, in the nature of things, have been based. Catesby says his animal had a median white stripe running from the head to the rump, "with four others, two on each side, running parallel with it." Evidently Linnæus in compiling his diagnosis must have carelessly missed the reference to the median white stripe, or else wrote *quatuor* in lapsus for *quinque.** If Coues had taken Catesby's description and figure instead of Linnæus's erroneous and repeatedly corrected diagnosis, it seems very improbable that he would have revived *Vierra putorius* for a species of *Spilogale*.

Again, Mr. Howell says that the reason Cuvier excluded *Viverra zorilla* from his Mouffettes is because Cuvier "considered it to be a weasel from the Cape of Good Hope and not a skunk at all." It is true, as I have before shown, that Cuvier believed that *Viverra zorilla* was a South African animal, but it is also true that he had specimens of it, and probably really excluded it on the same grounds that lead present day naturalists to exclude it from *Mephitis* and assign it to a separate genus *Spilogale*, namely, the character of the skull and teeth.† So, as said in my former paper,† he purposely excluded from his Mouffettes the only then known species of *Spilogale*, thus rendering it impossible to transfer the name *Mephitis* to the *Spilogale* group, as Mr. Howell has attempted to do.

Mr. Howell's contention that Cuvier's *Mustela putida* is based directly on *Viverra putorius* Linn. I am unwilling to concede, but hold that its real basis is the Conepate of Buffon. The two, however, have the same basis, Catesby and Kalm, but the Conepate is mainly Kalm while *V. putorius* is mainly Catesby. The Kalm element is therefore the saving feature in each case; but if *putida* from Cuvier cannot be used for the skunk of eastern Pennsylvania and New Jersey, neither can *putida* from Boitard be used for it, on account of the prior use of the name in the same genus (*i. e.*, *Mephitis*) by Cuvier. It may, however, be well to throw out *putida* as untenable, on accounts of its composite, very slight and wholly unsatisfactory basis.

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*It is important to note in this connection that Schreber, Erxleben, Zimmermann, and Gmelin wrote *quinque* and not *quatuor*, and that Schreber, evidently with Catesby's work before him, corrected Linnæus in quoting his diagnosis, as shown by the following literal transcript from Schreber: "Viverra putorius; Viverra fusca (vielmehr nigricans), lineis quatuor (oder eigentlich quinque) dorsalibus parallelis albidis. LINN. Syst. [ed. 12] p. 64, n. 4."—*Schreber*, Säuget., III, p. 442.

It may be further noted that Cuvier's diagnosis is evidently from Gmelin and not from Linnæus, for he says: "Noir, à cinq lignes parallèles, blanches sur le dos;" and that his "*Viverra putorius* L." should unquestionably stand *Viverra putorius* Gm. It also renders it probable that Cuvier's citation of "*Viverra mephitis* L." under his "le chinche" should also read *Viverra mephitis* Gm., as Mr. Howell has already suggested (N. Am. Fauna, No. 20, p. 14).

†"Si.... nous venons à examiner en lui-même l'animal auquel Buffon a apliqué le nom de *zorille*, et qu'il a représenté Hist. Nat. in-4°, tome XIII, pl. 42 [lege xli] nous trouvons qu'il ressemble par les dents, par les ongles et par la forme, comme par la grandeur, à notre *putois d'Europe*."—*G. Cuvier*, Ann. du Mus. d'Hist. Nat., IX, 1807, p. 445.

†Bull. Am. Mus. Nat. Hist., XIV, 1901, 330.

From the foregoing it is evident that I recede in no essential point from any of the positions assumed in my first paper, and that consequently I accept none of Mr. Howell's conclusions as formally stated by him in the summary at the close of his paper. They all depend, as said at the beginning of this article, upon the acceptance of the much discussed Catesby plate as a satisfactorily identifiable figure of the North Carolina *Spilogale*. With Mr. Howell's plate before them, I think few mammalogists will be able to agree with Mr. Howell on this point.

VOL. XV PP. 67-69 MARCH 22, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FIVE NEW MAMMALS FROM MEXICO.

BY C. HART MERRIAM.

Among the undescribed mammals collected in Mexico by E. W. Nelson and E. A. Goldman the following seem worthy of recognition:

Alouatta palliata mexicana subsp. nov.

Type from Minatitlan, Vera Cruz, Mexico. No. 79,398 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected April 23, 1896 by E. W. Nelson and E. A. Goldman. Original No. 9551.

Characters.—Similar to *A. palliata* but much smaller; rostrum narrower and more tapering anteriorly; zygomata less expanded vertically and lacking the hump on upper side posteriorly; coronoid process more broadly rounded; teeth (especially the last molar) decidedly smaller.

Measurements.—Type specimen ♂ ad.: total length 1190; tail vertebræ 651; hind foot 148.

Putorius tropicalis perdus subsp. nov.

Type from Teapa, Tabasco, Mexico. No. 100,041 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected March 31, 1900 by E. W. Nelson and E. A. Goldman. Original No. 14,074.

Characters.—Similar to *tropicalis* but somewhat larger (length 473 instead of 444); color richer and much darker, the color of upperparts dark as in *affinis* and completely covering hind feet and lower legs, and upper and outer sides of forelegs and feet except a small irregular yellowish blotch on top of forefoot. [In *tropicalis* the color is paler, the yellowish of underparts reaches down on inner side of hind leg and foot to toes, which are mainly yellow, and the forefeet and wrists are yellow all round.] Underparts with orange fulvous deeper and concentrated on belly and thighs, leaving *throat and sides of neck white* in contrast; facial white markings complete, the side stripe reaching above plane of eye, the patch between eyes large and broad (not restricted as in *tropicalis*); black cheek patches much larger and broader; no black spot under ear.

Cranial characters.—Skull like that of *tropicalis* but bullæ decidedly smaller and with anterior ends more obliquely cut off; zygomata shorter, heavier, and more highly arched.

Nasua narica molaris subsp. nov.

Type from Manzanillo, Colima, Mexico. No. $\frac{32630}{44553}$ ♂ ad., U. S. National Museum, Biological Survey Collection. Collected Feb. 7, 1892 by E. W. Nelson and E. A. Goldman. Original No. 1844.

Characters.—Similar to *N. narica* from eastern Mexico but gray of face more restricted; tail longer; skull slightly larger; molariform teeth, particularly the upper ones, very much larger and more massive.

Measurements.—Type specimen (♂): total length 1240; tail vertebræ 680; hind foot 122.

Remarks.—Externally this subspecies appears to present most of the color variations of *narica* from the east coast, but in the type and another specimen from Manzanillo the face is very much darker, the gray ring around the nose being narrower and more mixed with dark hairs and the gray bands connecting it with the superciliary stripe being nearly obsolete; the ground color in the type specimen and a female from the same place collected the same day is dark brown, lightened on the neck, shoulders and anterior part of back by a profuse grizzling of buffy or ochraceous hairs.

Platygeomys neglectus sp. nov.

Type from Cerro de la Calentura, about 8 miles northwest of Pinal de Amoles, Queretaro, Mexico. Altitude 9000 feet. No. 81,218 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected Sept. 4 1896 by E. A. Goldman. Original No. 10,142.

Characters.—Size small for a *Platygeomys* (about equaling *P. fumosus* from Colima); general appearance and characters as in *P. planiceps* but color paler and duller (less chestnut); size smaller; rostrum and nasals shorter; frontal flat interorbitally (not elevated on each side over the orbits); zygomatic arches parallel (instead of strongly divergent anteriorly); jugal light and slender, its faces not strongly developed.

Measurements.—Type specimen: total length 310; tail vertebræ 96; hind foot 42.

Remarks.—Cerro de la Calentura, on which Mr. Goldman secured 5 specimens of this new species, is an isolated mountain 150 miles north of Mt. Toluca where its nearest relative, *Platygeomys planiceps* occurs.

Spermophilus annulatus goldmani subsp. nov.

Type from Santiago, Tepic, Mexico. No. 91,259 ♀ ad., U. S. National Museum, Biological Survey Collection. Collected June 18, 1897 by E. W. Nelson and E. A. Goldman. Original No. 11,223.

Characters.—Similar to *S. annulatus* but hind foot smaller (averaging 52.5 instead of 56.5); whitish of eyelids clearer and more distinct; ferruginous of face, neck, thighs, and tail less extensive and usually less intense.

Measurements.—Type specimen: total length 430; tail vertebræ 216; hind foot 52. Average of 2 specimens from type locality: total length 428; tail vertebræ 212; hind foot 52.

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OF THE

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A NEW BOBCAT (LYNX UINTA) FROM THE ROCKY MOUNTAINS.

BY C. HART MERRIAM.

Two species of Bobcats inhabit the Rocky Mountain region. One is *Lynx baileyi*, the common species in Arizona, New Mexico, and the lower parts of Colorado; the other is an undescribed species, of much larger size and more boreal distribution which in Colorado and Utah is restricted to the mountains. It may be known as follows:

Lynx uinta sp. nov.

Type from Bridger Pass, south slope Uinta Mountains, Wyoming. No. $\frac{18915}{25648}$ ♂ ad., U. S. National Museum, Biological Survey Collection. Collected May 11, 1890 by Vernon Bailey. Original No. 1156.

Characters.—Size, largest of the subgenus; hind foot very large (200 mm.); tail very long (195 mm. in type), with 2 black bands in front of the black tip.

Color.—Upperparts buffy, grizzled and indistinctly dappled with gray and black but without distinct markings; underparts white with black spots, the spots becoming bands on inner sides of thighs and underside of arms; throat pale fulvous, washed with white and crossed by a distinct fulvous brown band which becomes dusky toward ends; a V-shaped black mark on anterior part of throat; tail with 2 or 3 distinct blackish bands on upper surface in front of black tip [in *baileyi* there is only one blackish band and one fulvous band].

Cranial characters.—Skull relatively long and narrow with well developed sagittal crest, broad ascending arm of maxillary, large heavy underjaw, and relatively small teeth. Compared with *L. baileyi*, its nearest relative, the breadth is about the same but the length is much greater (113–117 contrasted with 98–105); sagittal crest much longer and stronger; breadth of ascending arm of maxillary much greater; bullæ decidedly longer, especially in females; frontal region more elevated; anterior nares larger; underjaw larger, thicker and heavier; angular process and posterior part of horizontal ramus much broader.

Measurements.—Type specimen ♂ ad.: total length 1030; tail vertebræ 195; hind foot 200. Corresponding measurements of adult ♂ *baileyi* (average of 3 from Graham Co., Arizona): total length 838; tail vertebræ 148; hind foot 177.

Weight of fresh type specimen (not fat) 31 pounds.

VOL. XV PP. 73-74 MARCH 22, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THREE NEW FOXES OF THE KIT AND DESERT FOX GROUPS.

BY C. HART MERRIAM.

The collections of the U. S. Biological Survey contain Kit Foxes from the plains from Alberta to Colorado; and long-eared Foxes from the deserts of New Mexico, and thence westerly to the interior of California. The study of this material shows that the Canadian Kit Fox should be separated as a subspecies from *Vulpes velox*, that the Desert Fox of New Mexico and western Texas is a strongly marked subspecies of *V. macrotis*, and that the one inhabiting the San Joaquin Valley is a distinct species, as follow:

Vulpes velox hebes subsp. nov.

Type from Calgary, Alberta, Canada. No. 108,255 ♂ yg. ad., U. S. National Museum, Biological Survey Collection. Collected October 8, 1900 by Mackay and Dippie. Original No. 560(2890x).

Characters.—Similar to *velox* but decidedly larger and slightly grayer; dark patches on sides of nose darker; skull larger and heavier; palate much longer; underjaw longer, heavier, more bellied under sectorial tooth; coronoid processes higher. Young in September with back of head and middle of back very red.

Measurements.—Type specimen, ♂: total length 844; tail vertebræ 312; hind foot 130. Average of 4 males from the type locality: total length 844; tail vertebræ 280; hind foot 131. Average of 2 females from type locality: total length 844; tail vertebræ 280; hind foot 122.

Vulpes macrotis neomexicanus subsp. nov.

Type from San Andreas Range, New Mexico (about 50 miles north of El Paso). No. 98,646 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected April 4, 1899 by C. Barber. Original No. 2055x.

Characters.—Similar to *macrotis* but larger. Skull and teeth larger and heavier.

Cranial characters.—Compared with *macrotis* the skull is slightly larger and decidedly heavier and broader; rostrum much thicker; frontals broader; zygomata more spreading; bullæ larger and heavier with anteriorly projecting point on inner side; under jaw decidedly heavier and more bellied; coronoid process higher.

Curiously enough the skull resembles that of *muticus* from the distant San Joaquin Valley much more closely than it does that of its near neighbor, *macrotis.* Contrasted with *muticus* it is slightly smaller; bullae larger with anteriorly projecting point on inner side; under jaw less deeply bellied; crowns of lower premolars longer (especially the 3d and 4th) so that the lower premolars are in contact or nearly so, while in *muticus* they are widely spaced, even more so than in *macrotis.*

Measurements.—Adult female from Fort Grant, Arizona (measured in flesh by Dr. B. H. Dutcher): total length 820; tail vertebræ 300; hind foot 135. No measurements of male available.

Vulpes muticus sp. nov.

Type from Tracy, San Joaquin Valley, California. No. 75,828 ♂ ad., U. S. National Museum, Biological Survey Collection. Collected Nov. 5, 1895 by George Leonard.

Characters.—Similar to *macrotis* but decidedly larger; hind foot and tail longer; chin and under lip blacker; top of head and middle of back with more reddish brown showing through between grayish tips; outer side of hind foot more fulvous; top of hind foot less white; pectoral collar more pronounced; black tip of tail less extensive on underside.

Cranial characters.—Skull larger, broader, and more massive; frontals flattened and thickened, forming a triangular shield which in adults reaches to parietals; rostrum very much broader; postorbital processes larger and more massive; under jaw much heavier and more deeply bellied under sectorial and last premolar; carnassial teeth and molars larger and much heavier; premolars thicker but not otherwise larger.

Measurements.—Type specimen ♂ ad. (a well made study skin): total length 950; tail vertebræ 350; hind foot 122 [in flesh at least 126].

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW SHREWS OF THE SOREX TENELLUS GROUP FROM CALIFORNIA.

BY C. HART MERRIAM.

In examining a batch of shrews collected by my party in the High Sierra last summer, and comparing them with specimens previously obtained in the mountains of eastern California by the Biological Survey, I find two new forms of the rare *tenellus* group. They may be defined as follows:

Sorex tenellus lyelli subsp. nov.

Type from Mt. Lyell, Tuolumne Co., California. No. 109,530 ♂ yg. ad., U. S. National Museum, Biological Survey Collection. August 29, 1901. W. K. Fisher. Original No. 2275.

Characters.—Similar to *tenellus* in size, cranial characters, and general appearance but upperparts slightly browner; tail darker; rostrum and braincase not quite so flat; 3d unicuspid larger (instead of smaller) than 4th; unicuspid series heavier and more crowded, the 1st and 2d decidedly broader.

Measurements.—Type specimen ♂: total length 103; tail vertebræ 41; hind foot 12.

Sorex tenellus myops subsp. nov.

Type from White Mountains, California. No. $\frac{29559}{41634}$ ♀ ad. U. S. National Museum, Biological Survey Collection. July 13, 1901. E. W. Nelson. Original No. 1101.

Characters.—Similar to *tenellus* but slightly smaller; ears larger; color paler: skull shorter and broader; constriction and rostrum decidedly broader; rostrum abruptly broadened behind unicuspids; molariform teeth more deeply excavated posteriorly.

Measurements.—Type specimen, ♀ : total length 98; tail vertebræ 41; hind foot 12. A topotype measures: total length 98; tail vertebræ 41; hind foot 12.5.

Received Mar. 21, 1901

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW BEARS FROM THE ALASKA PENINSULA.

BY C. HART MERRIAM.

In June, 1901 Mr. James H. Kidder of Boston, and his friend Mr. Robert P. Blake, spent several weeks hunting bears at Chinitna Bay, a little south of Mt. Iliamna, on the west shore of Cook Inlet. Here they killed one black bear and ten large brown bears, the skulls and skins of which they kindly sent me for study. One of the brown bears was a cub of the preceding year; the others were of various ages from two years old to adult. Before receiving the data I examined the skulls and arranged them in two series, according to the size of the teeth, placing four which I took to be males in one series, and five which I supposed to be females in the other. When the data came I was surprised to learn that there was only one female (besides the cub) in the lot, and that of the eight males, four had large teeth and four small teeth. The skins did not show any marked differences. After studying the skulls and teeth at repeated intervals for two months, and going over the specimens carefully with Mr. Gerrit S. Miller, Jr., Mr. F. A. Lucas, and Mr. Wilfred H. Osgood, I am unable to account for the differences on any theory other than that two distinct species of large brown bears inhabit the same area on the Alaska Peninsula. In view of the facts I am reluctantly forced to describe the smaller of the two as a distinct species. In doing this I take pleasure in naming it in honor of Mr. Kidder, who has brought back the first series of skins and skulls, accompanied by reliable data, of the Alaska brown bears, and who has generously presented the type specimen to the Biological Survey Collection of the U. S. National Museum.

In the same connection I have examined the large Alaska Peninsula bear, of which the Biological Survey Collection now contains a fine series of skulls. Briefly, this bear proves to differ so markedly from both the Kadiak and Yakutat bears that I am obliged to name it also, and have recognized it as a subspecies of *Ursus dalli*, with which its range is probably continuous.

Ursus dalli gyas subsp. nov.

Type from Pavlof Bay, Alaska Peninsula. No. 91669 ♂ ad. U. S. National Musenm, Biological Survey Collection. Collected in 1897 by Willie Pavlof. Original No. 1052 X.

Characters.—Similar to *Ursus dalli* but very much larger; about the size of *Ursus middendorffi* from Kadiak Island.

Skull similar in general to that of *dalli* but much larger, heavier and more massive; postpalatal region much longer; frontals and vault of cranium higher and less flattened; rostrum longer and much more elevated; anterior nares very much larger, particularly higher; teeth larger.

From *Ursus middendorffi* of Kadiak Island, with which I originally confounded the big Alaska Peninsula Bear, it may be distinguished at once by the much smaller anterior nares. The nares are much larger than in *dalli* but much smaller and less flaring than in *middendorffi*. It differs from *middendorffi* further in having the frontal region less elevated, the median sulcus much more strongly marked; postpalatal region longer; paroccipital processes larger, more outspreading, and situated more posteriorly; heel of last upper molar cut off obliquely on outer side (instead of bluntly rounded).

Measurements.—Type skull: basal length 390; zygomatic breadth 285; palatal length 212; postpalatal length 177; occipito-sphenoid length 112.

Ursus kidderi sp. nov.

Type from Chinitna Bay, Cook Inlet, Alaska. No. 116,562 ♂ yg. ad., U. S. National Museum, Biological Survey Collection. Collected June 9, 1901 by James H. Kidder.

Characters.—Size large, equal to or slightly larger than *Ursus horri-*

bilis alascensis, but decidedly smaller than *Ursus middendorffi* and *U. dalli gyas;* claws rather short and blue-black, as in *Ursus dalli gyas.*

Color.—June specimens (in left over winter pelage): General color yellowish brown, darkest on belly and legs—the legs much darker than body. In spring and early summer the color is much the same as in *Ursus dalli gyas.*

Cranial and dental characters.—Skull large and massive; equal to or slightly larger than *Ursus horribilis alascensis* but much smaller than *U. dalli gyas* (the male smaller than female of *gyas*); lachrymal large and high, reaching up to maxillary protuberance on inner side of orbit. Teeth similar in general to those of *dalli* but decidedly smaller; lower sectorial nearly rectangular, the outer side only slightly constricted between cusps; heel of last upper molar with only 2 cusps [instead of 3] on inner side.

Measurements.—Type specimen, ♂ yg. ad: basal length of skull 301; occipito-sphenoid length 82; length of upper molariform series 74; of lower molariform series 70; breadth across upper incisors 44; $\mathrm{pm}^{\underline{4}}$ 15.5 x 13; $\mathrm{pm}^{\overline{4}}$ 12 x 8; $\mathrm{m}^{\underline{1}}$ 23 x 17; $\mathrm{m}^{\underline{2}}$ 34.5 x 18.5; $\mathrm{m}^{\overline{1}}$ 25 x 11; $\mathrm{m}^{\overline{2}}$ 26 x 15; $\mathrm{m}^{\overline{3}}$ 20 x 14.5.

VOL. XV PP. 81-82 APRIL 25, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RABBIT FROM SOUTHERN TEXAS.*

BY GERRIT S. MILLER, JR.

The cottontail of the tropical region of extreme southern Texas differs from the races inhabiting the neighboring portions of the lower austral life zone, and is equally distinct from the Mexican rabbits thus far known. It may therefore be described as:

Lepus simplicicanus sp. nov.

Type.—From Brownsville, Texas, No. $\frac{21805}{36508}$ United States National Museum, ♀ ad. Collected October 19, 1891 by F. B. Armstrong.

Characters.—In size and general appearance not unlike *Lepus chapmani* from Corpus Christi, Texas, but fur everywhere much shorter; color essentially similar, but grizzle of head and anterior portion of body much less coarse, owing to the reduced length of the pale ring on each hair.

Color.—Back a fine grizzle of black and cream-buff, the latter slightly in excess. The elements of the color are almost exactly as in *Lepus chapmani* except that the cream-buff is slightly more yellow, but the grizzle is less coarse owing to the fact that both pale rings and dark tips average about 1 mm. shorter. It is partly due to the different quality of the fur, the result of the finer, shorter hair of the Brownsville animal. Sides and rump somewhat paler than back, but without forming any distinct contrast. Head and ears colored as in *L. chapmani*, but here again the much shorter hairs and narrower color bands produce a very different general effect, a uniform, clear, yellowish gray that can scarcely be called a grizzle, and which lacks the clouding on forehead and cheeks due to the long black hair tips. Ears much more scantily haired than in the allied races, the hairs forming the inconspicuous fringe along anterior border only 4–5 mm. in length. Nape patch rufous, a shade lighter than in *L. chapmani.* Feet, tail and underparts essentially as in *L. chapmani*, except that the rufous tints are more dull and the shorter hair of the belly allows the plumbeous bases to appear more noticeably at surface. The plumbeous, however, is of less extent than in *chapmani.*

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Skull and teeth.—The skull and teeth do not differ from those of *Lepus chapmani.*

Measurements.—External measurements of type*: total length, 420; tail vertebræ, 68; hind foot, 91; ear, 90. Measurements of an adult male from the type locality*: total length, 416; tail vertebræ, 60; hind foot, 87; ear, 76.

Specimens examined.—Two skins and four skulls, all from the neighborhood of Brownsville.

Remarks.—While this rabbit is readily distinguishable from its nearest geographical ally, *Lepus chapmani*, its characters are in the quality of the fur and the arrangement of the colors on the individual hairs. The actual tints are almost exactly the same in the two animals, yet the Brownsville rabbit is an unusually well defined form.

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*From fresh specimens by collector.

Vol. XV, pp. 83-84 **April 25, 1902**

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW PHYLLOSTOME BAT FROM THE ISTHMUS OF PANAMA.*

BY MARCUS W. LYON, Jr.

In a small collection of bats recently received by the United States National Museum from Mr. J. W. Humphreys of Colon, Colombia, are two specimens of a species of *Uroderma* for which no name is available. It is closely related to *Uroderma bilobatum* Peters, which was described from Brazil and Guiana. Through the kindness of Messrs. Witmer Stone and J. A. G. Rehn I have been able to examine two specimens of *Uroderma bilobatum* from Brazil in the collection of the Academy of Natural Sciences of Philadelphia.

Uroderma convexum new species.

Type.—From Colon, Colombia, No. 111,722 United States National Museum, ♀ yg. ad. (in alcohol). Collected May 28, 1901 by J. W. Humphreys.

Characters.—Similar to *Uroderma bilobatum* Peters, but with tooth rows distinctly arcuate.

Description of type.—Upperparts near the sepia of Ridgway, the hairs lightening at base nearly to broccoli-brown; underparts light broccoli-brown, the hairs with short hoary tips making a general effect a little darker than the drab-gray of Ridgway. Side of head marked by a pair of white bands, the upper band extending from the posterior outer edge of the nose-leaf over eye nearly to posterior edge of ear; the lower extending from angle of mouth almost to tragus. A fine white line less prominent than the face markings extends along middle of back.

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Length of fur on middle of back about 5 mm., below, 3–4 mm.

Nose-leaf and ears as in *Uroderma bilobatum.* The nose-leaf appears smaller, but the specimen had been placed in formalin and afterwards dried before reaching the Museum. The rims of the ears and the margins of the attached portions of the nose-leaf are whitish; the ears and nose-leaf themselves as well as the wing membranes are blackish brown.

Skull and teeth essentially as in *Uroderma bilobatum.* The tooth-rows of *Uroderma convexum* are decidedly convex and arcuate, and less nearly parallel than those of *U. bilobatum.* All the teeth in *U. convexum* are a trifle larger than the corresponding teeth in *U. bilobatum;* most conspicuous are the greater widths of the upper premolars and molars, especially the last molars. That portion of the palate posterior to the last molar is decidedly shorter and narrower in *U. convexum* than in *U. bilobatum.* The rostrum of the Panama bat is a trifle shorter and wider than in the Brazilian specimen and the nasals are flattened instead of being slightly pinched up. The sagittal crest is about the same size in each species, but in *U. bilobatum* it divides anteriorly into two prominent lateral ridges, each of which terminates in a more or less prominent postorbital process; while in *U. convexum* these two ridges are lacking and the postorbital processes but little marked. This may be partly due to difference in age as the Panama specimen is somewhat younger.

Measurements of the type, and of No. 4883 Acad. Nat. Sci. Phila., from Chapada, Brazil: forearm, 43 (42); longest finger, 92 (92); tibia, 16 (15); foot, 10 (10.4); calcar, 5 (5); nose-leaf from tip of lance to lower edge of rounded lobe just above lip, 9.4 (11); greatest width of lance, 4 (5); greatest width of rounded portion of nose-leaf, 5 (6); height of ear from notch in front of antitragus, 9 (10 ; greatest width of ear, 8 (9); greatest length of skull, 23.4 (24); greatest width of skull, zygomatic, 13 (about 13); front of incisors to posterior edge of palate, 11.4 (12.4); length of palate posterior to last molars, 2.6 (3.4); front of upper canine alveolus to posterior edge of last upper molar, 8 (8); greatest width between outer surfaces of upper molars at alveoli, 9.6 (9.2); greatest length of mandible 15 (15.6); front of lower canine at alveolus to posterior edge of last molar 8.4 (9.2).

Remarks.—Uroderma convexum is closely related to *U. bilobatum* and is the only other known species of the genus as restricted by Rehn.*

The two cannot be distinguished by external characters alone, unless there should prove to be color differences. The two specimens from Brazil, in alcohol, are too worn and bleached for making useful comparisons. The species is based upon two specimens in alcohol, an adult female the type, and another female of adult size, but young, No. 111,721.

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*Proc. Acad. Nat. Sci. Phila. (1900) p. 757, February 9, 1901.

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PROCEEDINGS

OF THE

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GENERAL NOTES.

Ixoreus should replace Hesperocichla.

Baird proposed the name *Hesperocichla* (Review Amer. Birds, I, 12, 1864) for the Varied Thrush on the ground that Bonaparte's term *Ixoreus* (Comptes Rendus, XXXVIII, 3, note, Jan., 1854) was founded on some South American member of the family *Tyrannidæ.* Bonaparte's reference, however, will show that while he may have associated Gmelin's *Turdus nævius* with a bird of some other family, it is yet plain that his term was based upon Gmelin's name, and that in future *Ixoreus* should be used for the genus now called *Hesperocichla.* Bonaparte's reference is as follows: "Malgré les efforts de plume et de pinceau du célèbre ornithologiste Audubon, le *Turdus nævius,* Gm. (*Orpheus meruloides,* Sw.), n'est pas un Grive ni même un Chanteur, mais un VOLUCRE *Teniopterien,* type de mon nouveau genre *Ixoreus.*"

The two recognized forms should hereafter be called *Ixoreus nævius* (Gmelin), and *Ixoreus nævius meruloides* (Vigors).—*Charles W. Richmond.*

Two preoccupied avian genera.

Aphobus Cabanis (1851), for a South American icterine bird is preoccupied by *Aphobus* Gistel (Naturgesch, XI, 1848), and may be renamed *Aaptus* (type, *Agelaius chopi* Vieillot).

Floricola Elliot (1878), as a genus of Hummingbirds, is preoccupied by *Floricola* Gistel (Naturgesch, XI, 1848). In its place may be substituted *Anthoscenus* (type, *Trochilus longirostris* Vieillot).—*Charles W. Richmond.*

The proper name for the Arctic Horned Owl.

Swainson's name *Strix* (*Bubo*) *arctica* (Fauna Boreali-Americana, II, 86, Feb., 1832) for the Arctic Horned Owl, which has been unhesitatingly used by ornithologists for the boreal form of *Bubo virginianus*, appears to rest on an insecure foundation, since Forster in 1817 (Synoptical Catalogue of British Birds, 47) made use of the term *Bubo arcticus* for the Snowy Owl. Forster's name was rather timidly proposed as a new one for *Strix nyctea*, and as it has several years priority over that of Swainson it follows that our present *Bubo virginianus arcticus* will require another name. Hoy's *Bubo subarcticus*, which passed current for the Western Horned Owl until shown by Mr. Stone to be synonymous with Swainson's *arctica* will apparently have to supplant the latter. If this view should prove to be the correct one the Arctic Horned Owl ought in future to be called *Bubo virginianus subarcticus* (Hoy).—*Charles W. Richmond.*

A new name for Buthotrephis divaricata D. W.

In a paper describing some supposed fossil algæ from the Upper Silurian (Eurypterid beds) at Kokomo, Indiana, the writer recently gave the name *Buthotrephis divaricata* to a type resembling in form and apparently in texture the living *Codium tomentosum*. The name *Buthotrephis divaricata* was preoccupied by Kidston in 1886 (Cat. Palæozoic Pl. Brit. Mus., p. 243) for a species from the Wenlock shale (Upper Silurian) in Shropshire. Therefore the name *Buthotrephis speciosa* is here given to the plant from Kokomo described in the Proceedings of the U. S. National Museum, Vol. XXIV, p. 265, pl. xvi, 1901. The figure illustrating this species was reduced to three fourths the natural size, contrary to the explananation which reads "natural size".—*David White.*

Change of name of Ficus? hesperia from vicinity of Ashland, Oregon.

In my "Flora of the Montana Formation" (U. S. Geol. Surv., Bulletin No. 163, p. 45, pl. ix, fig. 5, 1900) I give the name *Ficus hesperia* to a new species of fossil plant from the north fork of Dutton Creek, Laramie Plains, Wyoming. In my paper on the "Fossil Plants Associated with the Lavas of the Cascade Range", (U. S. Geol. Surv., 20th Ann. Rept., Pt. III, p. 45, pl. ii, fig. 4, 1900), I employed the same name (*Ficus? hesperia*) for a different species from the vicinity of Ashland, Oregon. As the first mentioned publication antedates the other in appearance, the species so named in the latter paper must be changed. I therefore propose for it the name *Ficus? Applegatei*, in honor of the collecter, Mr. Elmer I. Applegate.—*F. H. Knowlton.*

Some names of American Cervidae.

The moose of northeastern North America was called *Cervus americanus* by Dewitt Clinton in 1822 (Letters on Nat. Hist. and Int. Resources of N. Y. p. 193, 1822) thirteen years before the publication of *Alces americanus* by Jardine (Nat. Lib. XXI, 125, 1835). Therefore the authority for the name *americanus* should be Clinton instead of Jardine as usually quoted. The name as proposed by Clinton first appeared in 1820 in one of a series of newspaper articles published under the nom de plume 'Hibernicus'. These letters subsequently appeared in book form in 1822. The name is unequivocably given and is accompanied by a diagnosis in which the moose is distinguished from the wapiti or elk. A mounted specimen seen in a museum at Albany, N. Y., is mentioned, which if still existing, could be considered the type of the species.

If the name *Cervus dama americana* Erxleben 1777, be recognizable, which I do not admit, it of course preoccupies the *Cervus americanus* of Clinton, in which case *Alces muswa* Richardson 1852 would stand for the moose. Thus the exceedingly doubtful grounds upon which some authors have recently attempted to overthrow the current name of the Virginia deer, might also serve to displace the name of the moose and we should have not one, but two of our most important animals bereft of their well-known names, to say nothing of the establishment of an uncertain precedent. The availability of Erxleben's interrogative, adjectival '*americanus*' is admittedly and unquestionably incapable of absolute demonstration and if it were simply ignored as a name, fixity of nomenclature would be subserved and no rule violated. In fact this would be quite in the spirit of canon XLV of the A. O. U. Code, which reads: "Absolute identification is requisite in order to displace a modern current name by an older obscure one"; that is, a current name is not to be overthrown except upon *absolutely convincing* evidence. If conservatism is ever to prevail it must be in such a case as this, in which it is hard to conceive conditions under which the principle of giving an established name the benefit of doubt would be more clearly justified.

Another well known name of an American deer, *Cervus mexicanus*, has been threatened recently and a new name proposed to replace it on the ground that its original basis was faulty (Allen, Bull. Am. Mus. Nat. Hist. XVI, 20, 1902). Gmelin, who was strictly a compiler, proposed *Cervus mexicanus* chiefly on the basis of Pennant's Mexican Deer (Hist. Quad. I, 110, pl. fig. 3, 1781). Pennant, however, was not altogether a compiler, and although the first citation under his Mexican deer is the unidentifiable Teuthlalmaçame of Hernandez, it is evident that this is not the basis of the name, for the description which follows and the accompanying figure do not at all agree with Hernandez. This was well understood by early authors. Desmarest says: "Cette espèce, qui n'est encore connue que par ses bois extrêmement rugueux . . ." (Mamm. II, 444, 1822); and Ham. Smith says: "This species not as yet figured, was first noticed by Mr. Pennant, who represented the horns from a pair in the Museum of the Royal Society and now in the British, to which the ticket of Mexican was attached. With this information he inferred it to belong to Hernandes's *Teutla Macame* . . ." (Griff. Cuv., IV, 130, 1827). That this was really the case there can be no doubt, for Hernandez's description is evidently composite, and is accompanied by a figure of an anomalous goat-like deer-antelope not referable to any known species, while Pennant's description applies in every particular to a deer and in nowise to an antelope, and is accompanied by a good figure of antlers which are at least those of a deer, and if abnormal, of the same sort of abnormality that frequently occurs in several forms of American deer. Antlers of this kind have been repeatedly figured (See Baird, Mamm. N. Am. p. 652, 1857; Baillie-Grohman, Sport & Life in W. Am. & B. C., p. 136, 1900; Recreation, XII, 348, 1900), and Mr. E. W. Nelson informs me that he has seen similar ones in Mexico. The horns figured by Pennant are perhaps still in the British Museum as Gray mentioned them as late as 1872 (Cat. Rum. Mamm. B. M. p. 83, 1872). That they were really horns of some form of American whitetail deer is shown by the characteristic subbasal snags and forward curving beams, in essential agreement with the horns figured by Baird (loc. cit.). Moreover, J. E. Gray, and others who have made reference to them, have unhesitatingly referred them to one or another of the whitetail group. The exact locality from which these horns came may be indeterminate, but even if this be so, the restriction of the name *mexicanus* by Lichtenstein (Darst. pl. XVIII and text, 1827–34) and the usage of subsequent authors gives abundant authority for its application to the deer of the Valley of Mexico. Surely a well known, current name, based, at least in part, upon an identifiable specimen, should not be displaced unless there is to be a general rejection of all names not based upon absolutely flawless descriptions and figures.—*Wilfred H. Osgood.*

The type locality of Ametrida minor H. Allen.

In the Proceedings of the Boston Society of Natural History (Vol. 26, p. 240–246, May, 1894), under the title, "On a New Species of Ametrida," Dr. Harrison Allen described a new bat, giving it the name *Ametrida minor*. He states, on page 241, "Locality unknown. Type, a male, mature individual in alcohol....Museum of the Boston Society of Natural History". This type specimen is still carefully preserved at the Society's museum, and at the time of its description was without label of name or locality. Thinking that it might be possible to obtain some clue as to the history of the specimen, I recently examined it, but, at first, found no data with it whatsoever, beyond a recent label giving its name and place of description. While putting the specimen away, however, a small bit of paper, rendered almost transparent through long immersion in the alcohol, was discovered in the bottom of the bottle, and on examination, it was found to bear on one side the number

781, written with lead pencil. A search was at once made among several old catalogues of the Society's collections, with the result that in "A new Catalogue of the Specimens in the Department of Comparative Anatomy belonging to the Boston Society of Natural History," 1859–1875, there was found the entry of this specimen, as "Phyllostoma," one example, from Surinam, received in 1832 from Dr. Cragin". From this it would appear that the type locality of *Ametrida minor* is Surinam, or Dutch Guiana, South America. The date of acquisition, as above given, is probably erroneous. This catalogue, it appears, was copied from an earlier manuscript catalogue and the date 1832 may have been substituted through mistake, for 1839, when Dr. Francis W. Cragin, in March of that year, presented to the Society "a large and valuable collection of Mammalia, Birds, Reptiles, Fishes, Insects and Shells from Surinam". The previously recorded donations of Dr. Cragin, as entered in an early catalogue of the '30's, did not include any mammals. The exact locality in Surinam whence the bat came, cannot now be determined; but, as I am informed by Dr. Cragin's son, Prof. F. W. Cragin, the donor of the specimen resided for a number of years at Paramaribo, where he was for a time U. S. consul, so that it is quite probable that it came from that vicinity. The coloration of the type specimen, as recorded by its describer, is "almost white", which may in part be due to bleaching in alcohol for these sixty odd years, though otherwise it is still in an excellent state of preservation. Trouessart appears to have omitted the species altogether from his recent "Catalogus".—*Glover M. Allen.*

An early name for the northern form of Sphyrapicus ruber.

About a year ago Mr. Joseph Grinnell (Condor, III, 12, 1901) described a new sapsucker from southern California as *Sphyrapicus varius daggetti*, restricting Gmelin's *Picus ruber* to the northwest coast region. Mr. W. H. Osgood has recently (N. A. Fauna, No. 21, 45, September 26, 1901) reversed the case by considering the northern form to be the new one, reviving for it *Picus flaviventris* Vieillot (Ois. Amer. Sept., II, 1807, 67), based on Cook's description (Last Voyage, II, 1784, 297). If Mr. Osgood's view of the question should prove to be the correct one, a still earlier term, *Picus ruber notkensis* Suckow (Anfangsgr. Naturgesch. Thiere, II, I, 1800, 535) will have to be considered. Suckow also based his name on Cook, and gave practically the same description as did Vieillot. He indicated the relationship of Cook's bird by making it a subspecies of *Picus ruber*, and was one of the first naturalists to consistently and intelligently use trinomials as we do at present. The proper name for the northern form would therefore appear to be *Sphyrapicus ruber notkensis* (Suckow).—*Charles W. Richmond.*

The color of the fully adult Ophibolus rhombomaculatus Holbrook.

In a recent contribution to this publication (p. 36) Mr. Gerrit S. Miller, Jr. has given a description of a large specimen (♂, 1090 mm. in length) of *Ophibolus rhombomaculatus* which was very differently marked from younger specimens, and which, he was led to believe exhibited the normal coloration of the fully adult of this species. I am inclined to think that Mr. Miller was in error in this, as I have had in my possession several large individuals of this species which were marked much like younger specimens.

On March 3d of the present year, I had brought to me a very large specimen of *Ophibolus rhombomaculatus*, 1150 mm. in length, which agrees perfectly with medium sized specimens in its color pattern; the colors are perhaps considerably less bright, but there is no indication of the uniform dorsal surface, or the longitudinal lateral stripe mentioned by Mr. Miller. On the body there are forty-five brown spots in a dorsal series extending from a short distance behind the head to the base of the tail. On the tail there are nine such spots. On each side of the body there is an indistinct series of about 42 smaller spots, mostly alternating with those on the back. The dorsal spots are of a warm brown color, more or less distinctly margined with blackish; they extend along about three scales and across about ten. The lateral spots are less distinct and include from one to three scales. The elongate spots behind the head are quite indistinct, but may be seen in certain lights. The belly is of a satiny, shining white anteriorly, becoming tinged with yellowish posteriorly, almost light orange for some distance in front of the vent. This last item is of especial interest in that, in Holbrook's description the color of the belly is given as salmon colored, more or less bright, a character which has never been observed in our northern specimens.—*W. P. Hay.*

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THE MAMMALS OF MARGARITA ISLAND, VENEZUELA.

BY GLOVER M. ALLEN.

During the summer of 1901, my friend Mr. Austin H. Clark, with two companions, visited Margarita Island, Venezuela, for the purpose of briefly investigating its fauna and flora. The only other scientific worker who has visited this island in recent years is Capt. Wirt Robinson, U. S. A., the results of whose observations on the birds in 1895, have already appeared.* As there stated by Capt. Robinson, the island "lies about midway between LaGuaira and Trinidad, and only some 17 miles distant from the nearest point of the Venezuelan coast. Its greatest length from east to west is 42 miles, and its greatest breadth from north to south 20½ miles. It consists of two portions connected by a narrow isthmus 12 miles in length; the western being an irregular quadrilateral 12 miles long by 9 miles broad, and the eastern a pentagon some 20 miles across. In the western portion some almost barren peaks rise to a height of 2300 feet". Of 10 species of mammals noted by Capt. Robinson as occurring on the island, specimens of 6 were preserved, and 3 of these have since been described as new. Mr. Clark's collections contained 15 specimens of mammals, representing 8 species, of which 4 had not previously been recorded from the island, and one, a squirrel, proves to be new. As might be expected, the native mammalian fauna appears to have been derived almost wholly from South America. It is interesting to note that the influence of the insular environment has been to fade out, to a greater or less degree, the colors of several of the species as compared with the colors of their nearest representatives of the continent and of Trinidad. The greater area of the island of Trinidad and the heavier growth of vegetation, with the consequent increase in humidity seem to have afforded conditions more like those of the mainland, and hence there is not so pronounced a tendency to paling out of the deeper colors such as is seen notably in the Murine opossum and the squirrel of Margarita Island, and also in several of the birds from the island, which have been described as new. From its comparatively small area, partial sterility, and greater isolation, Margarita is more open to the bleaching effects of sun and seawind. Whether the bleaching of colors in the case of certain pale insular forms is due to the direct action of exposure to the elements, or is acquired as an adaptation to a more or less barren environment, is an interesting question in this connection, and it is possible that both causes often interplay to produce a combined result.

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*Proc. U. S. Nat. Mus., XVIII, p. 649–685, pl. xxxiii, 1896.

A list of the mammals at present known from Margarita follows:

1. **Marmosa robinsoni** Bangs. Robinson Murine Opossum.

Didelphys murina Robinson, Proc. U. S. Nat. Mus., XVIII, p. 651, 1896.
Marmosa robinsoni Bangs, Proc. Biol. Soc. Washington, XII, p. 95–96, 1898.

Five specimens of this opossum were collected in 1895, by Capt. Robinson, and are characterized as forming a pallid insular species.

2. **Caluromys philander** (Linnæus). Woolly Opossum.

A single specimen was brought in to Mr. Clark at El Valle, on July 12, 1901. This was an adult female within whose pouch were three young clinging to the mammæ, and as yet hardly more than 3 cm. in total length. I have been unable to compare the adult specimen with others from the adjacent mainland, but in measurements, the skull agrees closely with the dimensions of an adult female skull from San Julián, given by Messrs. Robinson and Lyon (Proc. U. S. Nat. Mus., XXIV, p. 138, 1901); I have compared the skull also with that of *Caluromys trinitatis* (Thomas) from Caura, Trinidad, and find but little appreciable difference, although the nasal bones and the palate are a trifle broader in the Margarita specimen, and the jaw is a trifle heavier. In color, the skins of the Margarita and Trinidad animals are nearly identical, though Mr. Clark's specimen is perhaps a little paler, lacking the faint chestnut tint dorsally and being a shade paler below than the Trinidad species, as might perhaps be anticipated. The material at hand, however, would not at all warrant a separation.

3. **Sciurus nesæus*** sp. nov. Margarita Squirrel.

Sciurus æstuans hoffmanni Robinson, Proc. U. S. Nat. Mus., XVIII, p. 651, 1896.

Type from El Valle, Margarita Island, Venezuela, No. 619, collection of Glover M. Allen, ♀ adult. Collected July 8, 1901, by Austin H. Clark.

General characters.—Dorsal surface of body light ochraceous, sprinkled with black; terminal three-fourths of tail uniform ochraceous. Ventral surface of body bright orange-rufous.

Coloration.—Dorsal surfaces of head, body, and proximal fifth of tail, grizzled ochraceous, or ochraceous-buff, and black; the separate hairs are plumbeous at the base for a space of about 4 mm., then comes a band of about the same width of ochraceous-buff, followed by a band of black about one-half as wide, then a second band of ochraceous-buff about 2 mm. in width, and a fine black tip. The general effect is nearly the same as that seen in a bright skin of the red squirrel (*Sciurus hudsonicus loquax*) of southern New England in summer pelage. Sides of the body similar, but with less black; cheeks, and an indistinct eye ring, nearly pure ochraceous; dorsal surface of forearms and feet slightly brighter than the back. Ventral surface of body bright orange-rufous, less intense on the lower sides of the limbs. The terminal three-fourths of the tail is uniform ochraceous above, due to the entire concealment of the two small black rings, one at the base and one about half-way up on each hair; ventrally the tail shows a distinct border of orange-rufous, with the median area grizzled black and ochraceous. The whiskers of the type are nearly all pale ochraceous.

Remarks.—The type is unaccompanied by measurements, but the dry skin gives the following: length, 374 mm.; tail, 159 mm.; hind foot, 56.2 mm.; ear, 16 mm. Unfortunately the skull was completely shattered.

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*νησαῖος—belonging to an island, insular.

This very distinctly characterized species appears to be nearly related to *Sciurus griseogena* (Gray) of the neighboring coast region, rather than to the *S. æstuans* group. Specimens of *S. griseogena* collected by Capt. Robinson at San Julián, Venezuela, in July, 1900, match it closely in the bright orange-rufous of the underparts, but differ very greatly in the color of the dorsal surface, in which black is the predominating color, due to the partial reduction of the ochraceous bands on the body hairs, whereas in the Margarita squirrel the opposite change has taken place, and the black has given place to the ochraceous. Moreover, the entire tip of the tail is black in *S. griseogena*, and bright ochraceous in *S. nesæus*.

Mr. Clark obtained several of these squirrels in the woods on the mountain, which is just back of El Valle, but unfortunately was able to preserve only the single specimen collected near the town. This specimen will be deposited with the Bangs collection in the Museum of Comparative Zoology at Cambridge.

4. **Mus alexandrinus** Geoffroy. Roof Rat.

A single specimen of this rat was preserved by Mr. Clark, who states that it was trapped in one of the houses at El Valle. Capt. Robinson mentions "a rat (*Mus*)" as occurring on the island, but the species is not recorded.

5. **Mus musculus** Linnæus. House Mouse.

Both Capt. Robinson and Mr. Clark found the house mouse common in the open dwellings on the island. Four specimens preserved by Mr. Clark, appear to be considerably smaller than the species as found in New England. Two of these, in formalin, measure about 134 mm. and 138 mm. in length, with tails 68 mm. and 72 mm. respectively; both seem to be adult, and average 25 mm. smaller in total length than six specimens from eastern Massachusetts, while the tails are also slightly shorter.

6. **Loncheres** sp. Spiny Rat.

Loncheres Robinson, Proc. U. S. Nat. Mus., XVIII, p. 651, 1896.

A male specimen of a spiny rat was taken by Capt. Robinson on the island, July 9, 1895. It was much injured, and in its present condition, lacks the tail and part of the skin of the head. Mr. Oldfield Thomas has pronounced it as being near *L. punctatus*.

7. **Lepus margaritæ** Miller. Margarita Rabbit.

Lepus brasiliensis Robinson, Proc. U. S. Nat. Mus., XVIII, p. 651, 1896.

Lepus margaritæ Miller, Proc. Biol. Soc. Washington, XII, p. 97, April 30, 1898.

Capt. Robinson found these rabbits plentiful on the island in 1895 and mentions (Proc. U. S. Nat. Mus., XXIX, p. 162, 1901) that they were "split and dried like cod fish and brought by the boat load to La Guaira for sale". But two individuals were noted near El Valle by Mr. Clark, who states that the natives were in constant pursuit of them.

8. **Rhogeessa minutilla** Miller.

Vesperugo parvulus Robinson, Proc. U. S. Nat. Mus., XVIII, p. 651, 1896 (not *Rhogeessa parvula* H. Allen).

Rhogeessa minutilla Miller, Proc. Biol. Soc. Washington, XI, p. 139, May 13, 1897.

Rhogeessa minutilla Miller, N. Amer. Fauna, No. 13, p. 125, Oct. 16, 1897.

The single specimen from which this species was described was collected on the island by Capt. Robinson, July 8, 1895. The second known specimen was captured at El Valle, late in July, 1901, by Mr. J. R. Johnston, of Mr. Clark's party. He swept it into an insect net, thinking it was a large moth, as it flew past in the early morning twilight. Mr. Gerrit S. Miller, Jr., who has examined this specimen, writes that it fully bears out the characters of the type as given in the original description. The measurements taken from the specimen before skinning and after an immersion of several months in formalin, are: length, 66.5 mm.; tail, 31 mm.; ear, 11.5 mm.; forearm, 25 mm.; tibia, 11.4 mm. The specimen is now in the collection of the United States National Museum.

9. **Peropteryx** sp. Sac-winged Bat.

A single, much shattered specimen was obtained by Mr. Clark. It was a female and was shot in a large cave on the hill southwest of El Valle, July 13, 1901. It is quite possible that it represents an undescribed species, but more and better material is necessary to decide this point. It is intermediate in size between *P. canina* and *P. trinitatis*, the tibia, in the dried specimen skinned out from formalin, measuring 17 mm., and the forearm 40 mm. The skull is slightly smaller than that of *P. canina* though slightly heavier than that of *P. trinitatis*. The muzzle is short and broad as compared with that of *P. trinitatis* and slightly narrower than that of *P. canina.* It differs notably from both in having the first premolar in contact with the second premolar on the one side and the canine on the other, instead of separate from both, as in the two other species. There are also other minor differences, and the dentition throughout is rather heavier than in the other two forms mentioned.

10. **Molossus obscurus** E. Geoffroy. Dusky Molossus.

Three specimens were obtained by Mr. Clark, one of which, a young one and nearly naked, was found scrambling about on the roof of a house at El Valle, July 14th. The two adult examples were shot July 11, 1901, as they were hanging in a cave under a large rock. They show some slight individual variation, the male being the larger, and the fur a dark sooty color, with the bases of the hairs nearly white. The female is brighter, with a brownish cast, and the bases of the hairs a light fawn. Mr. Gerrit S. Miller, Jr., who also examined these specimens, writes that they are not referable to *M. pygmæus* of Curaçao, but appear to be *obscurus* as now understood.

11. **Micronycteris megalotis** (Gray). Common Long-eared Bat.

This species is probably common on the island. Capt. Robinson mentions taking a pair on July 12, 1895, at El Valle, from a slight hollow under a boulder. Two were secured in the large cave already mentioned, on July 13, 1901, by Mr. Clark.

12. **Glossophaga soricina** (Pallas). Shrew-like Glossophaga.

Two specimens of a Glossophaga obtained by Mr. Clark are referable to this species as at present understood. One is an adult male, and the other a young individual, still possessing its milk teeth. Both were shot July 13, 1901, in the large cave on one of the hills back of El Valle. A third specimen of Glossophaga, an adult female, was obtained in this cave on the same date, and though somewhat battered, seems rather distinct from the specimens of *G. soricina*, and may represen an undescribed species. Further material is necessary, however, to determine this point. It differs from *G. soricina* most notably, in the possession of a larger nose-leaf, a slightly longer, higher and broader skull, and in having the 1st and 2nd upper incisors separate from each other and the canines instead of touching, as in *G. soricina.* There are also a few other minor differences. The specimen is of a dull chestnut or tawny-brown, a color which I have not observed in the specimens of *G. soricina* examined.

13. **Cebus fatuellus** (Linnæus). Brown Capuchin.

Cebus apella Robinson, Proc. U. S. Nat. Mus., XVIII, p. 651, 1896.

A single monkey obtained on the island, July 13, 1895, seems referable to this species. It appears to be not uncommon, but is rather shy. Mr. Clark saw a single one in the thick growth on the mountain which rises back of El Valle, but he was unable to procure it. One or two were also seen, kept as pets by the natives.

[In addition to the foregoing, both Capt. Robinson and Mr. Clark mention a deer as occurring on the island, but no specimens were obtained. In this connection, it is of interest to recall Humboldt's statement, with regard to the small islet of Cubagua, lying between Margarita and the mainland. He says, "At Maniquarez [=Manicuaro on the mainland] we met with some creoles, who had been hunting at Cubagua. Deer of the small breed are so common in this uninhabited islet, that a single person may kill three or four in a day. I know not by what accident these animals have got thither, for Laet and other chroniclers of these countries, speaking of the foundation of New Cadiz [a small town on Cubagua], mention only the great abundance of rabbits. The *venado* of Cubagua belongs to one of those numerous species of small American deer, which zoologists have long confounded under the vague name of *cervus mexicanus.* .....Its color is a brownish red on the back, and white under the belly; and it is spotted like the axis". (Humboldt: Personal narrative of Travels to the Equinoctial Regions of the New Continent, during the years of 1799–1804, p. 424 of 1815 English translation). I am informed that Cubagua at the present time would hardly support as much game as this passage implies, but doubtless a hundred years have wrought a change, or the writer's remarks may possibly have referred in part to Margarita itself.]

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RIBES FROM NEW MEXICO.

BY T. D. A. COCKERELL.

Among the material collected during the past season in the neighborhood of Las Vegas I find a new variety of *Ribes leptanthum* Gray, which may be known as follows:

Ribes leptanthum veganum, var. nov.

Shrub about 2 to 3 m. high, with pale gray bark; on the branches the bark is almost silvery, on the twigs it becomes reddish-brown; prickles solitary on the nodes, or more abundant, long, slender, pale ferruginous; leaves shaped about as in *R. rotundifolium*, the deeply crenulate segments short and rounded; *leaves and petioles with glandular hairs*, petioles also with a little tomentum; peduncles short, flowers in pairs or solitary; calyx-lobes spreading, white, more or less margined with pink; calyx-tube pale greenish, cylindrical, stout (3 mm. wide); tube about 6 mm. long, lobes about 5½ mm.; petals slightly over 3 mm., little more than half length of calyx-lobes, white tipped with pink; stamens not reaching to end of petals; filaments bright crimson; pistil green, only reaching to bases of stamens. *Fruit glandular-hispid.*

Found along the Gallinas River, New Mexico, from about two miles below Las Vegas to Las Valles, from 5800 feet to 6300 feet altitude. Flowers during the last two weeks of April, and is freely visited by *Andrena porteræ.* Ckll., and other bees. Typical specimens in U. S., Na-

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tional Museum; the material collected April 20, 1901, may be taken as the type.

I thought this was a distinct species, having only a description of *R. leptanthum*, but Mr. Coville considers it a glandular-pubescent phase of *leptanthum*. The only other *Ribes* observed in the region of *R. l. veganum* is *R. longiflorum*, Nutt. (at Las Valles). Going north of Las Vegas towards San Ignacio, the beginning of the transition zone is marked by the abundance of *R. cereum*. Passing up Sapello Cañon to Beulah, in the Canadian zone, *R. cereum* vanishes, and we have instead *R. lentum*, *R. irriguum*, and a species discovered by my wife (only obtained in fruit) which Mr. Coville thinks is *R. mogollonicum*, Greene. Going still upward, on the top of the Las Vegas Range, at 11,000 feet (Hudsonian zone) we meet with only one of the Beulah *Ribes*—*R. lentum;* while under the spruce trees grows one not seen before, identified by Mr. Coville as *R. wolfii*.

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PROCEEDINGS

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SYNOPSIS OF THE NORTH AMERICAN SPECIES OF *SIGMODON.*

BY VERNON BAILEY.

The present brief synopsis of the North American species of *Sigmodon*, commonly known as cotton rats, is the outgrowth of an attempt to work out the distribution of the several forms occurring in the state of Texas. In this connection it became necessary to make a critical study of the group, which has resulted in the recognition of 21 apparently valid forms, 10 of which are here described for the first time. A long discarded name, *berlandieri*, is reinstated, and two recent names are placed in synonymy. Of the 21 species and subspecies, 9 occur in the southern United States; the others are scattered over Mexico and Central America. Of the four species described from northern South America I have seen no specimens. The names and type localities are as follows: *Sigmodon sanctæmartæ* Bangs, from Pueblo Viejo, Colombia; *Sigmodon bogotensis* Allen, from Plains of Bogota, Colombia; *Sigmodon peruanus* Allen, from Trujillo, Peru; *Sigmodon simonsi* Allen, from Eten, coast of northwest Peru.

The material on which the conclusions are based consists of about 1000 specimens in the Biological Survey collection and the private collection of Dr. C. Hart Merriam, both in the United States National Museum, besides a number of types and topotypes from other sources, for the use of which I am indebted to Dr. F. W. True, executive curator, and Mr. Gerrit S. Miller, Jr., assistant curator of mammals, in the U. S. National Museum; to Dr. J. A. Allen, curator of mammals and birds, American Museum Natural History; and to Mr. Outram Bangs, curator of mammals, Museum of Comparative Zoology.

The North American species of *Sigmodon* fall naturally into two groups, which may be designated the *hispidus* group, and the hairy-tailed group. The former, of which *hispidus* was the first named species, is characterized by a semi-naked tail, the coarse annulations of the epidermis being scarcely obscured by the short scattered hairs. The forms of this group inhabit the Lower Sonoran and Tropical zones, are widely distributed, with an almost continuous range, and, with the one exception of an overlapping species (*alleni*) are here treated as subspecies of *hispidus*. In general the pelage is coarse and hispid, usually much more so in summer than in winter, but this character varies considerably with the various forms. The group includes *hispidus*, *littoralis*, *spadicipygus*, *texianus*, *berlandieri*, *eremicus*, *arizonæ*, *mascotensis*, *tonalensis*, *major*, *toltecus*, *saturatus*, *microdon*, *borucæ*, and *alleni*.

The hairy-tailed group, of which *fulviventer* was the first known species, is characterized by a moderately hairy tail, the short, bristly hairs almost or quite concealing the underlying annulations. In most of the species the pelage is softer than is usual in the *hispidus* group. The group is not distinguished by cranial characters and the species differ as widely among themselves as they do from those of the *hispidus* group. So far as ascertained they inhabit the Upper Sonoran and Transition zones in widely scattered mountains in Mexico and adjoining parts of the United States. In most cases they appear to be isolated by surrounding areas belonging to lower zones. Most of the species seem to have a very limited distribution and are distinguished by strongly marked characters. The group includes *fulviventer*, *melanotis*, *minimus*, *ochrognathus*, *leucotis*, *alticola* and *amoles*, all but the last of which are treated as full species.

Key to Species.

1. Tail thinly haired; skull relatively long and narrow.
  2. Size large, hind foot averaging 32 or more.
    3. Upperparts mainly warm brown.
      4. Upperparts uniformly brown, size larger - - *hispidus.*
      4′. Upperparts brownest on rump, size smaller - *spadicipygus.*
    3′. Upperparts light gray, blackish or yellowish gray.
      4. Upperparts dark gray; much black and no brown *littoralis.*
      4′. Upperparts light buffy or yellowish gray.
        5. Upperparts pale buffy gray.
          6. Pelage fine and not very hispid - - - *eremicus.*
          6′. Pelage coarse and very hispid, especially in summer.
            7. Size large, hind foot averaging 40 - - *major.*
            7′. Size medium, hind foot not over 36.
              8. Hind foot about 33 - - - - *berlandieri.*
              8′. Hind foot 35–36 - - - - - *arizonæ.*
        5′. Upperparts dark buffy or yellowish gray.
          6. Upperparts buffy gray; hind foot about 34 *mascotensis.*
          6′. Upperparts yellowish gray; hind foot 41 - *tonalensis.*
  2′. Size small, hind foot averaging less than 32.
    3. Upperparts buffy gray - - - - - - *texianus.*
    3′. Upperparts tawny or dull brownish gray.
      4. Upperparts tawny or dull yellowish.
        5. Audital bullae wide and flattened - - - *borucæ.*
        5′. Audital bullae high and narrow, rounded or elongated.
          6. Tail short, averaging 103; audital bullæ narrow *saturatus.*
          6′. Tail longer, averaging 112; audital bullae short and rounded - - - - - - - *alleni.*
      4′. Upperparts dull brownish gray.
        5. Belly white; feet clear gray - - - - *toltecus.*
        5′. Belly grayish buff; feet yellowish brown - *microdon.*

1′. Tail well haired; skull short and wide.
  2. Upper half of outer surface of ear black.
    3. Size large, hind foot 30–33.
      4. Upperparts grizzled buffy; lowerparts ochraceous *ochrogaster.*
      4′. Upperparts grizzled tawny; belly rich ferruginous *melanotis.*
    3′. Size small, foot 28; upperparts gray; belly buffy *minimus.*
  2′. Outer and inner surface of ears whitish or buffy gray.
    3. Ears buffy gray; nose conspicuously ochraceous *ochrognathus.*
    3′. Ears light gray or whitish; nose not conspicuously ochraceous.
      4. Ears silvery gray; belly white - - - - *leucotis.*
      4′. Ears darker gray; belly buffy.
        5. Upperparts rich tawny gray - - - - *alticola.*
        5′. Upperparts dull tawny gray - - - - *amoles.*

Sigmodon hispidus Say and Ord.

Sigmodon hispidus Say and Ord, Jour. Acad. Nat. Sci. Phila., IV, pt. ii, 354, 1825.

Type locality.—St. Johns River, Florida.

General characters.—Pelage full and soft in winter, coarser and slightly hispid in summer.

Color.—Upperparts rich umber brown, darkened by black underfur and long black hairs; belly whitish, smoky gray or dull buffy brown; feet dull rusty brown; tail blackish, slightly lighter below.

Skull.—Relatively short and wide with well arched upper outline.

Measurements.—Average of 8 adults from Riceboro, Georgia: total length 256; tail 106; hind foot 32. *Skull* (No. 45,169, from Riceboro, Georgia): basal length 32; nasals 14; zygomatic breadth 21; mastoid breadth 15; alveolar length of upper molar series 6.7.

Distribution.—North Carolina to northern Florida and west to southern Louisiana, in Austroriparian zone.

Specimens examined.—Total number 125, from the following localities:

North Carolina: Raleigh 33, Elkin 1.

South Carolina: Georgetown 6, Beaufort 27, Society Hill 1.

Georgia: Augusta 5, Butler 5, Riceboro 20, Savannah 1, Nashville 1.

Florida: San Mateo 1, Gainesville 3, Chattahoochee 3, Milton, 2.

Alabama: Greensboro 5, Catherine 1, Gallion 4.

Mississippi: Bay St. Louis 3.

Louisiana: Houma 1, Lafayette 3, Avery 2.

Sigmodon hispidus littoralis Chapman.

Sigmodon hispidus littoralis Chapman, Bull. Am. Mus. Nat. Hist. II, 118, June 7, 1889.

Type locality.—East Peninsula, opposite Micco, Florida.

General characters.—Slightly larger and darker than *hispidus*, with coarser more hispid pelage.

Color.—Upperparts dark sooty gray coarsely lined by the dark and light hairs, buffy wash of the main coat obscured by the long black hairs and black underfur; feet and tail dark gray or blackish; upper surface of tail quite black.

Skull.—Relatively larger, narrower and less arched than in *hispidus*.

Measurements.—Average of 6 adult topotypes: total length 284; tail 114; hind foot 32. *Skull* (No. 70,808, ♂ ad.): basal length 33; nasals 14; zygomatic breadth 21; mastoid breadth 14.6; alveolar length of upper molar series 6.8.

Distribution.—Eastern part of the peninsula of Florida, from Lake Harney to the Everglades.

Specimens examined.—Total number 119 from the following localities in Florida: Peninsula opposite Micco (type locality) 42, Lake Harney 29, Titusville 17, Sebastian 9, Lake Kissimmee 2, Kissimmee River 5, Mullet Lake 2, Eden 4, Miami 7, Everglade 2.

Sigmodon hispidus spadicipygus Bangs.

Sigmodon hispidus spadicipygus Bangs, Proc. Bost. Soc. Nat. Hist. XXVIII, 192, March, 1898.

Type locality.—Cape Sable, Florida.

General characters.—Like *hispidus* but smaller, less uniformly brown, and with lighter dentition; pelage soft as in *hispidus.*

Color.—Upperparts dark brownish gray, becoming warm brown only on rump; belly grayish brown or whitish; feet dull brownish; tail blackish, slightly lighter below.

Skull.—Similar to that of *hispidus* but smaller with conspicuously lighter dentition.

Measurements.—Type: total length 279; tail 98; hind foot 31–33 [from original description]. *Skull* (No. 4485, ♂ ad., Bangs Collection, from Flamingo, Fla.): basal length 30; nasals 12; zygomatic breadth 19.5; mastoid breadth 14.5; alveolar length of upper molar series 6.2.

Distribution.—The extreme southern part of the peninsula of Florida.

Specimens examined.—Total number 8 from three localities: Cape Sable, Flamingo and Planter, Florida.

Remarks.—In external as well as cranial characters this form differs more from *littoralis* than from true *hispidus* with which Mr. Bangs supposed it to intergrade along the west coast of the peninsula of Florida.

Sigmodon hispidus texianus (Aud. and Bach.).

Arvicola texiana Aud. and Bach. Quad. N. Am. III, 229, 1853.

Type locality.—Brazos River, Texas.

General characters.—Slightly smaller and paler than typical *hispidus.*

Color.—Upperparts grayish brown or dark buffy gray; belly grayish or buffy white; feet clear gray; tail gray with blackish line along the top. Colors darkest in fresh fall pelage, lightest in faded spring pelage.

Skull.—Differing from the skull of *hispidus* mainly in smaller size, less arched outline, and smaller, more rounded audital bullae.

Measurements.—Average of 4 adults from Richmond, Texas: total length 248; tail 103; hind foot 30. *Skull* (No. 97,014, ♂ ad.): basal length 30; nasals 13; zygomatic breadth 21; mastoid breadth 14; alveolar length of upper molar series 6.4.

Distribution.—Approximately the eastern half of Texas, westward to Vernon and San Antonio, and northward to Cairo, Kansas.

Specimens examined.—Total number 77 from the following localities:

Texas: Richmond 4, Matagorda 20, Velasco 1, Port Lavaca 6, Talley Island 6, Corpus Christi 4, San Antonio 18, Boerne 1, Fisher Co. 1, Vernon 2, Gainesville 1.

Oklahoma: Ft. Reno 2, Ft. Cobb 1, Orlando 2, Alva 1.

Kansas: Cairo 1.

Remarks.—*S. texianus* is an intermediate form between the dark, rich *hispidus* and the very pale *berlandieri*, grading both ways in accordance with the change from humid to arid climate. Specimens from Oklahoma and Kansas are almost equally near to *hispidus*, while San Antonio and Corpus Christi specimens could just as well be referred to *berlandieri*.

Sigmodon hispidus berlandieri Baird.

Sigmodon berlandieri Baird, Proc. Acad. Nat. Sci. Phila., VII, 333, 1855.

Sigmodon hispidus pallidus Mearns., Proc. U. S. Nat. Mus., XX, 504, March 15, 1897. From El Paso, Texas.

Type locality.—Rio Nazas, Coahuilla, Mexico.

General characters.—About the size of *hispidus* or averaging a little smaller and much paler; pelage full and soft in winter, thin and very hispid in summer.

Color.—Upperparts light buffy or ashy gray; nose not conspicuously yellowish; belly white; feet light gray; tail distinctly bicolor, light gray below, blackish above.

Skull.—Similar to the skull of *texianus;* differing from that of *hispidus* in less arched outline and smaller, more rounded bullae.

Measurements.—(No. 58,074, ♂ ad., from Jimulco, Coahuila, Mexico): total length 232; tail 105; hind foot 33. Average of 5 adults from Del Rio, Texas: total length 256; tail 113; hind foot 32.5. *Skull* (No. 58,073, ♂ ad., from Jimulco, Coahuila): basal length 30.5; nasals 12.3; zygomatic breadth 19; mastoid breadth 13.4: alveolar length of upper molar series 6.5.

Distributian.—Rio Grande and Pecos valleys from Brownsville to El Paso, Texas, and Carlsbad, New Mexico; south to southern Jalisco, Mexico.

Specimens examined.—Total number 200, from the following localities:

Texas: El Paso and vicinity 7, Guadalupe Mts. 4, Langtry 3, Painted Caves 3, Del Rio 7, Sycamore Creek 3, Eagle Pass 7, Santa Tomas 27, Sauz 2, Brownsville 20, Ft. Clark 3.

New Mexico: Carlsbad 3.

Chihuahua: Juarez 1, Chihuahua City 18, Santa Rosalia 8, Presidio del Norte 1.

Coahuila: Rio Nazas 1, Jimulco 2.

Nuevo Leon: Doctor Arroyo 1.

Tamaulipas: Nuevo Laredo 7, Matamoras 11, Camargo 26, Victoria, 2, Jaumave 6, Soto la Marina 9.

San Luis Potosi: Hda. La Parada 3, Villar 1, Jesus Maria 1, Molino 1.

Queretaro: Tequisquiapam 1.

Zacatecas: Valparaiso Mts. 3.

Jalisco: Huejuquilla 1, Lagos 2, Atemajac 1, Ameca 1, Chacala 1, Zacoalco 3, Zapotlan 2.

Remarks.—S. h. berlandieri is a pale desert form of the *hispidus* group ranging over a wide extent of extremely arid country in western Texas and northeastern Mexico and intergrading with forms to the east, south and west.

Prof. Baird described it from specimens "collected between San Antonio and El Paso by Mr. Clark and in Northern Mexico by Lieut. Couch". The skulls of these two specimens still in the U. S. National Museum show no important subspecific characters but are of importance geographically. The one from between San Antonio and El Paso apparently, but not positively, (see old museum catalogue) came from Presidio del Norte, and the other, No. 566, from Rio Nazas, southern Coahuila (Baird, Mamm. N. A. p. 505). No type was designated but as Baird gave full measurements of No. 566 this specimen is generally considered the type. Specimens in the Biological Survey collection from Jimulco (about 30 miles south of the short Coahuila section of the Rio Nazas), from near the mouth of the Pecos and from El Paso, Texas, are indistinguishable and are all clearly referable to this pale gray form. Typical specimens of *berlandieri* are no nearer to typical *texianus* than that species is to *hispidus*, so that if *texianus* is to be recognized, *berlandieri* must also be.

Sigmodon hispidus eremicus Mearns.

Sigmodon hispidus eremicus Mearns, Proc. U. S. Nat. Mus. XX, 504, advance sheets, March 15, 1897.

Type locality.—Cienega Well, Sonora, Mexico, on east bank of Colorado River, 30 miles south of United States and Mexican boundary line.

General characters.—Size slightly larger than *hispidus;* pelage fine and rather lax and soft, colors pale.

Color.—Upperparts pale yellowish gray; belly whitish; feet light gray; tail brown above, gray below. From *berlandieri* it differs in slightly more buffy upperparts and less of the mixture of black hairs.

Skull.—Heavy, rough and much ridged, even in specimens that are not very old; coronoid process of jaw short and wide; bullae short and rounded as in *berlandieri.*

Measurements.—Type: total length 280; tail 128; hind foot 34. *Skull* of type: basal length 30.6; nasals 13.3; zygomatic breadth 20.3; mastoid breadth 14; alveolar length of upper molar series 6.6.

Distribution.—Along both sides of the lower Colorado River.

Specimens examined.—Total number 49 from the following localities:

Sonora: Cienega Well, south of Mexican boundary on east side of Colorado River 19, Colorado River at mouth of Hardee River 11.

California: Ft. Yuma 19.

Sigmodon hispidus arizonae Mearns.

Sigmodon hispidus arizonae Mearns, Bull. Am. Mus. Nat. Hist. II, 287, Feb. 21, 1890.

Type locality.—Ft. Verde, Arizona.

General characters.—Size large; pelage coarse and hispid; colors pale.

Color.—Upperparts light buffy gray as in *berlandieri;* nose slightly yellowish; belly white; feet and tail as in *berlandieri* and *eremicus.*

Skull.—I have not been able to get a skull of this species for examination, but the original measurements show it to have been larger than the average *eremicus* skull.

Measurements.—Type (from original description): total length 320; tail 121. Hind feet of two topotypes taken from dried specimens, 35 and 36. *Skull* (from original description): total length 40; nasals 15.9; zygomatic breadth 23; alveolar length of upper molar series 7.1.

Remarks.—Without seeing skulls of this form I am in doubt as to its status and affinities, but the two skins from the original topotype series, kindly sent for examination by Dr. Allen, indicate a larger form than *eremicus* with more hispid pelage.

Sigmodon hispidus mascotensis Allen.

Sigmodon mascotensis Allen, Bull. Am. Mus. Nat. Hist. IX, 54, March 15, 1897.

Sigmodon colimae Allen, Bull. Am. Mus. Nat. Hist. IX, 55, March 15, 1897. From Plains of Colima, Colima, Mexico.

Type locality.—San Sebastian, near Mascota, Jalisco, Mexico.

General characters.—Slightly larger than *hispidus* or *berlandieri*, with especially longer tail and larger hind foot; pelage in summer very coarse and hispid.

Color.—Upperparts dark buffy gray with bright buffy or ochraceous nose; belly yellowish white; feet dull brownish gray; tail brownish gray below and brownish black above, less distinctly bicolor than in *berlandieri.*

Skull.—Averaging larger than in *berlandieri* with relatively smaller bullae and the same concavo-convex interparietal and posteriorly truncate nasals.

Measurements.—Type (from skin): total length 272; tail 117; hind foot 32. Average of 6 adults from Colima: total length 253; tail 116; hind foot 34. *Skull* of type: basal length 30.7; nasals 13.3; zygomatic breadth 19.4; mastoid breadth 13.2; alveolar length of upper molar series 6.3.

Distribution.—West coast of Mexico from western Jalisco to southern Oaxaca.

Specimens examined.—Total number 62 from the following localities:

Jalisco: San Sebastian 2.

Colima: Colima 10, Armeria 12.

Guerrero: Chilpancingo 5, Acapulco 1, near Ometepec 2, Tlaxtoquilla 1.

Oaxaca.—Puerto Angel 5, Oaxaca 5, Tehuantepec 6, Tamazulapam 2 im., Huajuapam 3 im., Cuicatlan 1 im. (sp?).

Morelos: Yautepec 4 im., Quernevaca 2 im.

Michoacan: Querendaro 1 (very large).

Sigmodon hispidus tonalensis subsp. nov.

Type from Tonala, Chiapas, Mexico, No. 75,144, U. S. National Museum, Biological Survey Collection. ♂ ad. Collected August 9, 1895 by E. W. Nelson and E. A. Goldman. Original No. 8312.

General characters.—Similar to *mascotensis* but larger and slightly browner; pelage very hispid.

Color.—Upperparts yellowish brown, more yellowish about nose; belly creamy white; feet and tail dull brownish gray, tail not distinctly bicolor. *Young*, duller and slightly darker colored.

Skull.—Long and narrow, heavily ridged in adults, interparietal pointed at ends and wide in middle, pushing supraoccipital well back.

Measurements.—Type: total length 350; tail 166; hind foot 41. *Skull* of type: basal length 34.5; nasals 15; zygomatic breadth 22; mastoid breadth 14.5; alveolar length of upper molar series 6.8.

Distribution.—Western Chiapas and eastern Oaxaca.

Specimens examined.—Total number 5, from 3 localities:

Chiapas: Tonala 1; Mountains near Tonala 1.

Oaxaca: Santo Domingo 3 (not typical).

Remarks.—This is merely a large form of *mascotensis*, from which there is no sharp geographic separation. Specimens from Chilpancingo, Guerrero, could be referred to it as well as to *mascotensis.*

Sigmodon hispidus major subsp. nov.

Type from Sierra de Choix, 50 miles northeast of Choix, Sinaloa, Mexico. No. 96,275, U. S. National Museum, Biological Survey Collection. ♂ ad. Collected October 20, 1898 by E. W. Nelson and E. A. Goldman. Original No. 13,154.

General characters.—Very large, almost equalling *Mus norvegicus;* feet stout; tail with coarse annulations; pelage coarse and hispid.

Color.—Upperparts light brownish gray; nose yellowish; belly white or yellowish white; feet light gray; tail blackish above, dark gray below.

Skull.—Massive and heavily ridged in adults; interparietal strap-shaped with wide, rounded ends; nasals notched posteriorly; audital bullae relatively as well as actually large and elongated.

Measurements.—Type: total length 365; tail 156; hind foot 40.5. Average of 5 adults: 351; 160; 40. *Skull* of type: basal length 36; nasals 16; zygomatic breadth 23.5; mastoid breadth 16.4; alveolar length of upper molar series 7.3.

Distribution.—West coast of Mexico from Tepic to southern Sonora.

Specimens examined.—Total number 16, from the following localities:

Sinaloa: Sierra de Choix 6, Culiacan 1, Rosario 1, Plomosas 1.

Tepic: Acaponeta 2, Tepic 1, San Blas 1.

Sonora: Alamos 3 (not typical).

Remarks.—This largest North American species of *Sigmodon* occurs with *alleni* at San Blas, Tepic, and while it may be quite distinct from its nearest congeners, *berlandieri* and *mascotensis* and does not appear to overlap the range of either, it unquestionably belongs to the same general group and should stand as a subspecies.

Sigmodon hispidus toltecus Saussure.

Hesperomys toltecus Saussure, Rev. et Mag. de Zool. XII, p. 98, 1860.

Type locality.—Mountains of the state of Vera Cruz, Mexico.

General characters.—Conspicuously smaller and darker colored than *berlandieri;* molars and audital bullae relatively smaller.

Color.—Upperparts dull brownish gray; belly whitish; feet dark gray, not yellowish or brown; tail bicolor, gray below, blackish above.

Skull.—Smaller than that of *berlandieri* with much smaller bullae and molars.

Measurements.—Average of 8 adults from Orizaba, Vera Cruz: total length 235; tail 100; hind foot 28. *Skull* (No. 58,226, ♂ ad. from Orizaba): basal length 29.5; nasals 13; zygomatic breadth 18; mastoid breadth 13; alveolar length of upper molar series 6.

Distribution.—Eastern Mexico from Alta Mira, southern Tamaulipas to Orizaba, Vera Cruz.

Specimens examined.—Total number 54 from the following localities:

Vera Cruz: Orizaba 17, Chichicaxtle 4, Mirador 1.

Tamaulipas: Alta Mira 12.

San Luis Potosi: Valles 7.

Puebla: Metlaltoyuca 13.

Remarks.—This is the only known species of North American *Sigmodon* of which I have not been able to examine the type or topotypes. As no more definite type locality was assigned than the mountains of Vera Cruz, I am assuming that the Orizaba specimens are typical, an assumption that seems safe in view of the wide range of the form, and the fact that no other species is known to occur in the general region, and that the characters assigned in the original description do not disagree with those of the present series of specimens from localities covering most of the state of Vera Cruz. Specimens from as far north as Alta Mira, Tamaulipas, are indistinguishable from the Orizaba series, but farther north they seem to grade into *berlandieri,* while in the lower country of southern Vera Cruz they run into *saturatus.*

Sigmodon hispidus saturatus subsp. nov.

Type from Teapa, Tabasco, No. 99,998, U. S. National Museum, Biological Survey Collection ♂ ad. Collected April 5, 1900, by E. W. Nelson and E. A. Goldman. Original No. 14,108.

General characters.—About the size of *berlandieri* but with much shorter tail and richer coloration; larger and more fulvous than *toltecus.*

Color.—Upperparts dark reddish brown; belly dull cinnamon brown, rarely whitish; feet yellowish brown; tail black, but little lighter below. *Young,* darker and duller colored.

Skull.—Short and compact with heavy rostrum; molars and audital bullae as in *berlandieri.*

Measurements.—Average of 7 adult topotypes: total length 250; tail 103; hind foot 31.2. *Skull* of type: basal length 29.5; nasals 12.7; zygomatic breadth 19; mastoid breadth 13.5; alveolar length of upper molar series 6.

Distribution.—Mainly in Chiapas, Tabasco, and southern Vera Cruz.

Specimens examined.—Total number 101, from the following localities:

Tabasco: Teapa 18, Frontera 4, Monte Cristo 2.

Chiapas: Palenque 1, Yajalon 1, Chicharras 4, Huehuetan 7, Mts. near Comitan 7, Comitan 8, Ocuilapa 2, Tenejapa 2.

Guatemala: Zunil 2, Hda. Chancol 2, Jacaltenango 6, Nenton 7.

Oaxaca: Tuxtepec 4, Cuicatlan 1 (im.), Mts. near Santo Domingo 3.

Vera Cruz: Tlacotalpam 2, Otatitlan 3, Coatzacoalcos 6, Motzorongo 9.

Remarks.—While the rich coloration is unusually marked in specimens from Teapa, the type locality, considerable variation is shown throughout the wide range assigned to this form. Specimens from the west slope in southern Chiapas and western Guatemala are slightly larger and duller colored without showing any difference to warrant separation or agreeing with any other described form. In general appearance they resemble *S. borucae* Allen, of Costa Rica, more than anything else, but in cranial characters are nearer to *saturatus.* To the northwest the intergradation with *toltecus* is shown by specimens from Motzorongo.

Sigmodon hispidus microdon subsp. nov.

Type from Puerto Morelos, Yucatan, No. 108,467, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected March 13, 1901 by E. W. Nelson and E. A. Goldman. Original No. 14,581.

General characters.—Size small; tail short; colors dark and dull; teeth smaller than in any other North American *Sigmodon.*

Color.—Upperparts dark, dull brown; belly grayish white or buffy; tail black above, brownish black below.

Skull.—Small, slender, and narrow posteriorly with small audital bullae and very small molars.

Measurements.—Type: total length 243; tail 96; hind foot 32. *Skull* of type: basal length 28.4; nasals 12.5; zygomatic breadth 18; mastoid breadth 13; alveolar length of upper molar series 5.5.

Distribution.—Northern Yucatan and Campeche.

Specimens examined.—Total number 45, from the following localities: *Yucatan:* Puerto Morelos 2, La Vega 5, Tunkas 5, Chichen Itza 20. *Campeche:* Apazote 17.

Remarks.—From *toltecus* this form is readily distinguished by darker coloration and brown instead of gray feet, from *saturatus* by duller colors and smaller size, and from both by its very light dentition. Specimens from Apazote and Chichen Itza are grading toward *saturatus.*

Sigmodon hispidus borucae Allen.

Sigmodon borucae Allen, Bull. Am. Mus. Nat. Hist. IX, 40, March 11, 1897.

Type locality.—Boruca, Costa Rica.

General characters.—Size medium, about as in *berlandieri,* pelage rather soft.

Color.—Upperparts dull yellowish brown; belly grayish or buffy white; feet grayish brown; tail blackish above, grayish brown below.

Skull.—Nearest to that of *saturatus* but distinguished by the smaller, flatter audital bullae, and other slight characters.

Measurements.—Type (from original description): total length 275; tail 115; hind foot (measured dry) 30. *Skull:* basal length 29; nasals 12; zygomatic breadth 18; length of upper tooth row 5.5.

Distribution.—Costa Rica; specimens examined from the type locality only.

Remarks.—*Sigmodon h. borucae* belongs to the *toltecus* group of rather small, dark colored forms, but shows good subspecific characters, differing from *toltecus* in darker coloration, brown instead of gray feet, heavier dentition and other slight skull characters; from *microdon* in larger size, longer tail, heavier dentition and flatter audital bullae; from typical *saturatus* in duller coloration, longer tail, flatter audital bullae; but from Guatemala specimens of *saturatus* it does not differ in color.

Sigmodon alleni sp. nov.

Type from San Sebastian, Mascota, Jalisco, Mexico, No. 88,227, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected March 15, 1897 by E. W. Nelson and E. A. Goldman. Original No. 10,708.

General characters.—Size of *berlandieri* but with slenderer feet and tail, smaller molars, brighter colors, and softer pelage; pelage fine and not hispid in winter or summer.

Color.—Upperparts dull tawny; belly white or buffy; feet yellowish brown; tail black above and brownish below. *Young,* dark umber brown, soon becoming tawny.

Skull.—Similar to that of *berlandieri* but with narrower braincase, double convex outlines of interparietal, smaller molars, and smaller, shorter, more rounded bullae.

Measurements.—Average of 8 adults from type locality: total length 244; tail 112; hind foot 31.6. *Skull* of type: basal length 29.3; nasals 13; zygomatic breadth 19.3; mastoid breadth 13; alveolar length of upper molar series 6.4.

Distribution.—Western Jalisco and southern Tepic in Western Mexico.

Specimens examined.—San Sebastian, Jalisco, 10, San Blas 1, Tepic 2, and Valle de Banderas 1.

Remarks.—Although belonging to the *hispidus* group, *alleni* is quite distinct from all neighboring species, occurring at the type locality with *mascotensis*, the west coast form of *berlandieri*, and at San Blas with *major*. It is the species Dr. Allen had in mind in writing his description of *mascotensis* from which he intended to separate the Colima form, but as his two specimens of the species here named *alleni* were not fully adult he unfortunately selected as his type another specimen that proves to be the same as the form to which on the following page he gave the name of *colimae*. As these two names apply to the same species I have placed *colimae* as a synonym under *mascotensis* and taken the opportunity of associating Dr. Allen's name with the species which he intended to describe.

Sigmodon fulviventer Allen.

Sigmodon fulviventer Allen, Bull. Am. Mus. Nat. Hist., II, p. 180, October 21, 1889.

Type locality.—Zacatecas, Zacatecas, Mexico.

General characters.—Size largest of the hairy tailed group; tail covered with short, bristly hairs that almost conceal the annulations; pelage rather hispid.

Color.—Upperparts yellowish brown, lightened on sides by white bristles; upper half of outer surface of ear black; lowerparts and feet clear rich fulvous; tail brownish black above and below.

Skull.—Short, wide, and heavily ridged, not much arched, not bulged interorbitally; interparietal, about 2 mm. wide and not divided; supraoccipital with a slight median ridge; nasals short, wide and rounded at ends; jaw short and heavy with short, wide coronoid.

Measurements.—Type: total length 270; tail 108; hind foot 33. *Skull* of type: total length over incisors 35.5; nasals 13; zygomatic breadth 21.5; alveolar length of upper molar series 6.3. The broken base of the skull makes the usual set of measurements impossible.

Distribution.—Known only from two localities; from about 8000 feet altitude near the city of Zacatecas and from Durango, Durango. Specimens examined 2.

Sigmodon melanotis sp. nov.

Type from Patzcuaro, Michoacan, Mexico, at 7000 feet altitude. No. 50,190, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected July 15, 1892 by E. W. Nelson. Original No. 2834.

General characters.—Size nearly equalling that of *fulviventer;* colors darker and richer; pelage softer; tail equally hairy.

Color.—Upperparts dark, rich ochraceous, heavily lined with black; outer and part of inner surface of ears black; face and nose blackish; belly clear, dark, rusty ochraceous; feet yellowish brown; tail mainly black, yellowish below at base.

Skull.—High and heavily ridged in adults with zygomatic arches falling low at sides; interorbital space narrow and bulged on top; nasals rounded at ends: interparietal about 2 mm. wide and not divided; supraoccipital with distinct median ridge.

Measurements.—Type: total length 275; tail 100; hind foot 31. Average of 4 from type locality: 257; 102; 31. *Skull* of type: basal length 31.4; nasals 12.2; zygomatic breadth about 20.5; mastoid breadth 14.5; alveolar length of upper molar series 6.3.

Distribution.—Known only from a series of 15 specimens from Patzcuaro.

Sigmodon minimus Mearns.

Sigmodon minima Mearns, Proc. U. S. Nat. Mus., XVII, 130, July 19, 1894.

Type locality.—Upper Corner Monument, Grant Co., New Mexico, on the Mexican boundary line 100 miles west of the Rio Grande.

General characters.—Size small, hind foot about 28; tail hairy as in *fulviventer;* pelage not hispid.

Color.—Upperparts clear gray, with coarsely grizzled appearance, and without yellowish on nose or rump; belly buffy; feet gray; tail brownish black above and below.

Skull.—Short and wide with abruptly spreading zygomata; interparietal narrow; supraoccipital with slight median ridge; audital bullae small and basioccipital narrowed between them.

Measurements.—Type: total length 223; tail 94: hind foot 28. Topotype: 223; 91; 27. *Skull* of type: basal length 28.5; nasals 11.3; zygomatic breadth about 19; mastoid breadth 14; alveolar length of upper molar series 5.9.

Distribution.—Mountains of southern New Mexico, Arizona and northern Mexico.

Specimens examined.—Total number 14 from the following localities:

New Mexico: Grant Co., near Mexican line, 2, (including type).
Arizona: Fort Huachuca 2.
Chihuahua: Casas Grandes 1.
Sonora: Santa Cruz River 9.

Remarks.—This is the northernmost form of the hairy tailed group.

Sigmodon ochrognathus sp. nov.

Type from the Chisos Mts., Texas, 8,000 feet altitude No. 110,333, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected June 13, 1901, by Vernon Bailey. Original No. 7681.

General characters.—Size small; tail long and hairy; pelage but slightly hispid.

Color.—Upperparts yellowish gray, strongly tinged around ears, face and rump with ochraceous; nose, orbital ring and base of tail clear, bright ochraceous; belly white; feet buffy gray; tail blackish above, buffy gray below.

Skull.—Similar to that of *minimus* but interparietal with a posterior indentation, bullae narrower and basioccipital shorter and wider; nasals short, wide, and truncate posteriorly.

Measurements.—Type: total length 260; tail 117; hind foot 29. *Skull* of type: basal length 28; nasals 11.6; zygomatic breadth 19; mastoid breadth 13; alveolar length of upper molar series 5.5.

Distribution.—The transition zone top of the Chisos Mts., Texas and 6,700 feet altitude near Parral, Chihuahua. Four specimens examined from the type locality, and one from near Parral.

Sigmodon leucotis sp. nov.

Type from the Valparaiso Mts., Zacatecas, Mexico, 8,700 feet altitude, No 92,001, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected December 2, 1897, by E. W. Nelson and E. A. Goldman. Original No. 11,812.

General characters.—Size medium; tail short and hairy; pelage rather soft; colors dull, with conspicuously light ears.

Color.—Upperparts dull brownish gray; ears whitish gray; belly whitish; feet brownish gray; tail black, becoming brownish at the base below.

Skull.—Short, wide and heavily ridged along sides; interparietal narrow, with a dividing suture across middle in 11 out of 13 specimens; supraoccipital sloping, without trace of median ridge; nasals short, narrow and notched at posterior end; audital bullae full and oval.

Measurements.—Average of 8 adult topotypes: total length 234; tail 91; hind foot 29.4. *Skull* of type: basal length 31; nasals 11.4; zygomatic breadth 20.5; mastoid width 15; alveolar length of upper molar series 6.

Distribution.—Known only from the type locality. Number of specimens examined 13.

Remarks.—The divided interparietal occurs in one other species from Oaxaca, but as it is not entirely constant it is probably of little significance.

Sigmodon alticola sp. nov.

Type from Cerro San Felipe, Oaxaca, Mexico, at 10,000 feet altitude, No. 68,231, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected August 24, 1894, by E. W. Nelson and E. A. Goldman. Orginal No. 6624.

General characters.—Size medium; tail hairy; pelage long and soft both in winter and summer; colors dark and rich except gray ears.

Color.—Upperparts dark ochraceous or light umber brown; ears clear gray, a little darker than in *leucotis;* belly pale cinnamon brown; feet yellowish gray; tail black, becoming yellowish brown below at base.

Skull.—Similar to that of *leucotis* in form but slenderer, less heavily ridged and narrower interorbitally; interparietal narrow with a dividing suture in middle; supraoccipital without median ridge; nasals narrow and rounded at ends; lateral pits of palate very shallow.

Measurements.—Type: total length 230; tail 101; hind foot 28.5. *Skull* of type: basal length 28.5; nasals 11; zygomatic breadth 17.8; mastoid breadth 13.5; alveolar length of upper molar series 6.3.

Distribution.—Mountains of Oaxaca.

Specimens examined.—Cerro San Felipe 1, 15 miles west of Oaxaca 2.

Sigmodon alticola amoles subsp. nov.

Type from Pinal de Amoles, Queretaro, Mexico, at 7,000 feet altitude. No. 81,430, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected September 18, 1898, by E. W. Nelson and E. A. Goldman. Original No. 10,161.

General characters.—Similar to *alticola* but upperparts duller and less tawny, skull wider interorbitally, with slightly smaller bullae and deeper lateral pits of palate; interparietal narrower but not divided.

Measurements.—Type: total length 252; tail 105; hind foot 29.5. *Skull* of type: basal length 29.5; nasals 5.7; zygomatic breadth 19.6; mastoid breadth 14; alveolar length of upper molar series 6.3.

Distribution.—Known from only 2 specimens from type locality.

Remarks.—While there seems hardly a possibility of continuity of range across the wide gaps of low country separating the type localities of the two forms, the slight difference of the present form from *alticola* does not admit of more than subspecific rank.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SEVEN NEW MAMMALS FROM WESTERN TEXAS.

BY VERNON BAILEY.

In working out the distribution of the various species of mammals inhabiting the state of Texas, I find the following forms that need subspecific recognition. Two of the genera, *Eutamias* and *Microtus* were not previously known to occur within the state. The muskrat, while described from southern New Mexico, occurs also along the lower Pecos and Rio Grande.

Eutamias cinereicollis canipes subsp. nov.

Type from Guadalupe Mts., Texas. Altitude 7,000 feet in Transition Zone. No. 109,229, U. S. National Museum, Biological Survey Collection, ♀ ad. Collected August 24, 1901, by Vernon Bailey. Original No. 7827.

General characters.—Similar to *cinereicollis* in fresh postbreeding pelage, but grayer throughout, with paler and duller ochraceous on sides; tips of the long hairs on rump and upper surface of tail white instead of yellowish; feet clear gray without a tinge of yellowish; black dorsal stripe reaching forward to between the ears.

Measurements.—Type: total length 230; tail vertebræ 104; hind foot 35. *Skull* of type: basal length 30; nasals 11; zygomatic breadth 19.3; mastoid breadth 15.8; alveolar length of upper molar series 5.8.

Remarks.—The present form needs no comparison with its nearest neighbor, the little light colored *gracilis*.

Spermophilus spilosoma marginatus subsp. nov.

Type from Alpine, Texas, No. 108,927, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected July 5, 1901, by Vernon Bailey. Original No. 7702.

General characters.—Similar to the dark, typical form of *spilosoma* from northeastern Mexico, but smaller and brighter colored.

Color.—Upperparts bright cinnamon brown, the whole back from ears spotted with whitish, the spots conspicuously edged with black.

Skull.—With relatively small bullae and wide basioccipital.

Measurements.—Type: total length 225; tail vertebræ 67; hind foot 32. *Skull* of type: basal length 33.7; nasals 13.3; zygomatic breadth 23.5; mastoid breadth 19; alveolar length of upper molar series 7.2.

Specimens examined.—Alpine 1; Toyahvale 1; Presidio Co. 1 (im).

Remarks.—From the El Paso form, *marginatus* differs in darker color and heavier spotting; from *major* in finer, sharper spotting, and from both in the black edging of spots as well as in cranial characters.

Spermophilus spilosoma arens subsp. nov.

Type from El Paso, Texas, No. 64,977, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected May 10, 1894, by Dr. A. K. Fisher. Original No. 1446.

General characters.—Similar to *cryptospilotus* but larger with coarser spotting.

Color.—Upperparts light clay color or dark buffy, finely spotted over back and rump with white, the spots without black edges. Distinguished from neighboring forms by its pale colors.

Skull.—Like that of *cryptospilotus* but more elongated, with wider nasals and heavier dentition.

Mersurements.—Type: total length 237; tail vertebræ 85; hind foot 35. Average of 5 adults: 230; 78; 34. *Skull* of type: basal length 33; nasals 12; zygomatic breadth 22; mastoid breadth 18; alveolar length of upper molar series 7.

Specimens examined.—El Paso, Texas, 5; Casas Grandes, Chihuahua 4.

Microtus mexicanus guadalupensis subsp. nov.

Type from Guadalupe Mts., Texas, altitude 7,800 feet. No. 109,191, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected August 21, 1901 by Vernon Bailey. Original No. 7807.

General characters.—Slightly larger and lighter colored than *mexicanus*, with skull characters distinguishing it from both *mexicanus* and *mogollonensis.*

Color.—Upperparts dull umber brown; belly buffy gray; feet and tail brownish gray. Scarcely distinguishable from *mogollonensis* in color.

Skull.—Comparatively long, with short, wide nasals, rounded at posterior ends; incisors dark orange instead of light yellow; middle upper molar with projecting inner point at base of posterior triangle as in *mogollonensis.*

Measurements.—Type: total length 152; tail 34; hind foot 20. Average of 9 adults: 144; 34; 19. *Skull* of type: basal length 24.5; nasals 7.5; zygomatic breadth 16; mastoid breadth 12.4; alveolar length of upper molar series 7.2.

Fiber zibethicus ripensis subsp. nov.

Type from the Pecos River at Carlsbad (Eddy), New Mexico, No. 109,012, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected July 25, 1901, by Vernon Bailey. Original No. 7757.

General characters.—Size small; color paler than in *zibethicus* but darker than in *pallidus;* skull narrow; incisors heavy.

Color.—Adults in July: Upperparts light brown without any distinct black; belly buffy brown; throat gray, inclosing a sharp, dusky chin stripe; a small spot over each nostril whitish.

Skull.—Small and narrow; nasals short and rounded or pointed at posterior end, never notched; incisive foramina widest at posterior end; incisors heavy, molars light.

Measurements.—Type: total length 470; tail 202; hind foot 67. Average of 6 adults: 463; 204; 68. *Skull* of type: basal length 55; nasals 18; zygomatic breadth 35; mastoid breadth 25; alveolar length of upper molar series 15.

Remarks.—This form is distinguished from *zibethicus* by paler color, smaller size, heavier incisors, unnotched nasals, and form of incisive foramina; from *pallidus* by darker color, narrower skull, form of nasals and incisive foramina, and slightly heavier dentition. No other comparisons are necessary.

Thomomys fulvus texensis subsp. nov.

Type from the head of Limpia Creek at 5,500 feet altitude in the Davis Mts., Texas, No. 2251, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected January 7, 1890, by Vernon Bailey. Original No. 876.

General characters.—Similar to *Thomomys fulvus* but smaller, less dusky, and with narrower skull.

Color.—Upperparts dusky fulvous with blackish ear patch and nose; lowerparts plain bright fulvous; feet and lips gray; lining of pouches white.

Skull.—Similar to that of *fulvus* but with conspicuously narrower braincase, shallower lateral pits of palate, and shorter pterygoids.

Measurements.—Type: total length 204; tail 63; hind foot 26. Average of 10 adults: 193; 60; 26. *Skull* of type: basal length 34.5; nasals 13; zygomatic breadth 22; mastoid breadth 18; alveolar length of upper molar series 7.

Remarks.—The affinity of the present form with the *fulvus* group is shown by the general form of skull and by the wide, flat basioccipital with sharp instead of rounded lateral edges as well as by the similarity of color.

Thomomys aureus lachuguilla subsp. nov.

Type from arid foothills near El Paso, Texas, No. 110,336, U. S. National Museum, Biological Survey Collection, ♂ ad. Collected September 24, 1901, by Vernon Bailey. Original No. 7858.

General characters.—A small, light yellowish form of the *aureus* group with big bullae and narrow basioccipital.

Color.—*Summer pelage:* Upperparts dull ochraceous; belly buffy or pale cinnamon. *Winter pelage:* Brighter ochraceous above and light buffy below.

Skull.—Slender, with conspicuously slender rostrum; bullae full and rounded with basioccipital narrowly constricted between; interparietal small and rounded or quadrate; premaxillae slender and projecting well back of nasals; upper incisors bent down at right angles to axis of skull.

Measurements.—Type: total length 215; tail 65; hind foot 29. Average of 4 adults: 201; 61; 27.4.

Remarks.—Named for the *Agave lachuguilla* which furnishes its favorite food.

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PROCEEDINGS

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A LIST OF THE BATRACHIANS AND REPTILES OF THE DISTRICT OF COLUMBIA AND VICINITY.

BY W. P. HAY.

The following list which completes the series, published by various authors in various papers, upon the vertebrata of the District of Columbia, represents the work of many collectors extending over a long series of years. The compilation of records was begun in 1890 by Mr. Frederick C. Test, at that time aid to the curator of Reptiles in the United States National Museum, and since 1895 has been continued by the author.

Extensive collecting by Mr. Test and myself with the cooperation of many friends, among whom I might mention several of my pupils at the Central High School, has been the means of adding new species to our known fauna and of establishing numerous additional stations for those already known.

In the effort to make my paper of greater value than a mere list of species I have prepared keys to all the species known to occur, or likely to occur within our limits, and have given brief descriptions and such notes on the habits as my very limited space makes possible. I have drawn the descriptions of form and color largely from the paper of my father, Dr. O. P. Hay, on the Batrachians and Reptiles of the State of Indiana, but have been at some pains to modify them to suit the peculiar requirements of the present case. The notes on the habits are such as I have been able to make during some fifteen years of collecting in the central states and in this locality, but most of those on the cries of the frogs have been furnished me by Mr. Gerrit S. Miller, Jr., who has enjoyed exceptional advantages for the observation of these animals.

It is a matter of regret to me that my paper could not have been expanded into many times its present volume so that these extremely interesting and much neglected groups of animals might have been given an adequate exposition, but under the circumstances it has been impossible.

My thanks are due to the many friends who have assisted in the compilation of records, but perhaps most of all to Dr. L. Stejneger, of the United States National Museum, who has been kind enough to review my manuscript, and call my attention to errors which otherwise would have appeared in the text.

Key to the Classes and Orders.

a. Body scaleless in all our species; covered with a skin which is usually smooth, soft, and more or less slimy, but sometimes rough and warty; eggs laid in or near the water and giving origin to tadpoles (Water-dogs, salamanders, toads, and frogs). Class BATRACHIA.

- *b.* Body with a distinct tail throughout life; hind limbs, if present, not especially enlarged. Order CAUDATA, p. 123.
- *bb.* Body without tail except during immature stages; all four limbs present, the hind pair much the larger. Order SALIENTIA, p. 127.

aa. Body covered with yielding, overlapping scales, or enclosed in a bony, box-like shell; eggs, when laid, deposited on land and giving origin to young which are similar in form to the adults (alligators, lizards, snakes, and turtles). Class REPTILIA.

- *c.* Body not enclosed in a shell. Order SQUAMATA, p. 132.
- *cc.* Body enclosed in a box-like shell (turtles). Order CHELONIA, p. 142.

CLASS BATRACHIA.

Up to the present time the known species of *Batrachia* of the region about Washington number 23. These are distributed as follows: Caudata 11, Salientia 12. The distinguishing characters of these groups having been given above; there follows the key to the order Caudata.

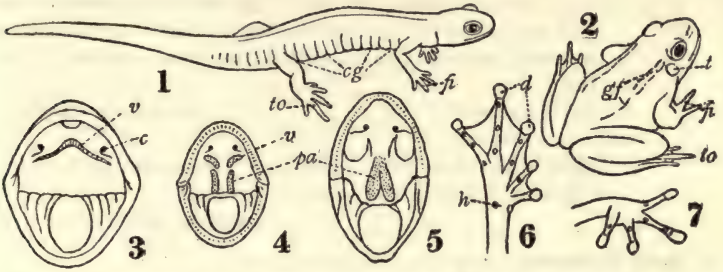

FIG. 1. Topography of the salamanders and frogs. *cg*, costal grooves; *fi*, fingers; *to*, toes; *gf*, glandular folds; *v*, vomerine teeth; *pa*, parasphenoid teeth; *c*, choanæ; *d*, adhesive disks; *h*, heel; *t*, tympanum.

Key to the Species of Caudata.

- *a.* Body eel shaped; hind limbs absent. *Siren lacertina*, 1.
- *aa.* Body salamander-shaped; all 4 limbs present.
  - *b.* Toes 4 in front and 4 behind. *Hemidactylium scutatum*, 3.
  - *bb.* Toes 4 in front and 5 behind.
    - *c.* Parasphenoid teeth present.
      - *d.* Tongue mushroom-like, attached by a central stalk only.
        - *e.* Costal grooves 13 or 14.
          - *f.* Tail not much, if any, longer than rest of animal; yellowish, back with median row of dots, and two dusky bands. *Spelerpes bislineatus*, 6.
          - *ff.* Tail considerably longer than rest of animal.
            - *g.* Yellow, with many black spots; tail with black cross bars. *Spelerpes longicaudus*, 8.
            - *gg.* Yellow, back with a broad median and two lateral bands; tail with yellow cross lines. *Spelerpes guttolineatus*, 7.
        - *ee.* Costal grooves 15 to 17; red, with many small black dots. *Spelerpes ruber*, 9.
      - *dd.* Tongue attached by a median longitudinal band running from the central stalk to the tip, therefore extensively free only at the sides.
        - *h.* Costal grooves 16 to 19. Color dark ashy or brown, with or without a rusty dorsal band. *Plethodon cinereus*, 4.
        - *hh.* Costal grooves 14.
          - *i.* Black above, with small white dots. *Plethodon glutinosus*, 5.
          - *ii.* Brownish, variously mottled and marbled with darker and ocraceous. *Desmognathus fusca*, 10.
    - *cc.* Parasphenoid teeth absent.
      - *j.* Tongue small, free at the sides; a medium sized species, greenish or red, belly yellow with many black specks. *Diemictylus viridescens*, 11.

- *jj.* Tongue large, attached by nearly the whole posterior surface and almost filling the mouth; large clumsy species, brown or black, variously marbled or spotted with whitish or yellow.
  - *k.* Costal groves 11. - - - *Ambystoma opacum*, 2.
  - *kk.* Costal grooves 12.
    - *l.* Sole with 2 distinct tubercles. *Ambystoma tigrinum*, 2a.
    - *ll.* Sole with 1 indistinct tubercle or none. *Ambystoma jeffersonianum*, 2b.

1. **Siren lacertina** Linnaeus. Siren; Mud Eel.

Body elongate, eel-like; head flat, tapering to the blunt snout; three pairs of external gills; eyes very small; anterior limbs short, with 4 toes; hind limbs absent. Bluish black, paler below. Length 2 to 3 feet.

A single record from the Potomac Flats testifies to the presence of this species within our limits. It seems to spend most of its time in the soft mud of swamps, and is, therefore, seldom observed even where it is common.

2. **Ambystoma opacum** (Gravenhorst). Marbled Salamander.

Body short, stout, and swollen; tail short; limbs weak. Dark brown or black above, with about a dozen bluish gray cross bars; an irregular splotch on head and nape of the same color. Length 3½ inches.

Reported from Takoma Park, Laurel, Md., and Mt. Vernon, Va. At the latter locality I took two specimens from under an old stump in a very dry locality.

2*a*. **Ambystoma tigrinum** (Green). Tiger Salamander.

Body large, heavily built, with long tail, and stout legs. Bluish or brownish black, more or less spotted or blotched with bright yellow. Length, 5–10 inches.

There are no definite records for this species within our limits but it will doubtless be found to occur here.

2*b*. **Ambystoma jeffersonianum fuscum** (Green). Jefferson Salamander.

Body and head rather elongated; head broad and somewhat depressed; tail rather long, compressed. Dark bluish or brownish, or black, paler below; sides sometimes with small white spots. Length 5–8 inches.

As with the preceding there is no record of the capture of this species within our limits, but careful collecting will probably add it to our fauna.

3. **Hemidactylium scutatum** (Schlegel). Scaly Salamander.

Body slender; head depressed, broadest just behind the eyes; snout short, truncate; base of tail with a decided constriction, beyond which the tail swells out and then tapers to a sharp point; legs weak; toes short, almost rudimentary. Brown, chestnut, or purplish, bluish white below; above there are numerous pale spots and specks; below there are specks and spots of black. Length 3.5 to 4 inches.

In the collection of the United States National Museum there is a specimen labelled, "D. C.", but with data so insufficient as to throw the locality in some doubt. During the collecting seasons of 1892 and '93 I found the species occasionally under logs in the heavy woods between Little Hunting Creek and the Mt. Vernon estate.

4. **Plethodon cinereus** (Green). Ashy or Red-backed Salamander.

Body elongate, slender, cylindrical; head small and short, snout rounded: eyes large and prominent; limbs short and weak; toes short, the inner ones rudimentary. Brownish black above; whitish or yellowish below, finely marbled with black; back often with a broad, brownish red longitudinal stripe. Length 3.5 to 4 inches.

Both the red-backed and brown varieties of this species are found in abundance throughout the region covered by this list. They are to be looked for under bark, leaves, logs, or flat stones in damp situations in the woods.

5. **Plethodon glutinosus** (Green). Slimy Salamander.

Body cylindrical or somewhat depressed; skin smooth, shining and very slimy; legs moderately developed, the toes short and depressed, the inner on fore and hind legs small, but distinct. Black or blue-black above, paler below; sides with numerous whitish spots about as large as the eye. Length 3 to 7 inches.

Rather common within our limits. I have found it most abundant about Takoma Park and Mt. Vernon.

6. **Spelerpes bislineatus** (Green). Two-lined Triton.

Body elongate and slightly depressed; tail forming about one half the total length; head rather narrow, snout short and rounded. Color yellowish brown or clear yellow above, pale yellow below; along each side of the back there is a brown line extending from the eye to the tail. Length about 3 inches.

A very common species throughout the region. It may be sought under the stones or leaves near springs or small streams.

7. **Sperlepes guttolineatus** (Holbrook). Holbrook Triton.

Body somewhat flattened, elongate and slender, but stouter than in *S. longicaudus;* head flat, snout rounded; tail low and flattened, forming more than one half the total length, tapering to a sharp point. Brownish yellow above, with three stripes of dark brown, one along the median line and one on each side; tail dark brown with vertical, yellow lines; the under surface is yellow mottled with brown. Length about 5 inches.

This triton has been taken at Dun Loring and Munson Hill, Va. It is a southern species and its occurrence in our fauna is probably very rare.

8. **Spelerpes longicaudus** (Green). Long-tailed Triton.

General appearance and proportions very similar to the preceding. Above, bright yellow or orange with many black spots and specks, some of which may form an interrupted band along the sides; tail with vertical black bars; below, the color is paler and there are no spots. Length 5 to 6 inches.

Until the fall of 1896 this salamander was known from our region by a single, very indefinite record which was all the more unsatisfactory that the specimen had been lost. In September of that year I secured a fine, well developed individual from among some damp leaves, near Great Falls, on the Maryland side of the river.

9. **Spelerpes ruber ruber** (Daudin). Red Triton.

Body varying with age but rather heavy and clumsy; head depressed and short, snout rather pointed; tail about two fifths total length, strongly keeled. Color varying from clear coral red in the young to brownish red in the fully adult; above, there are numerous small black spots, distinct in the young but much diffused in old individuals. Length 3 to 6 inches.

The typical form alone occurs here. It is very abundant and has been recorded from nearly every spring in the vicinity. From the muddy margins of a spring near Brookland, I once secured over twenty specimens and from a spring near Accotink, six. I have also seen it crawling about on land after a rain.

10. **Desmognathus fusca fusca** (Rafinesque). Brown Triton.

Body rather heavily built and somewhat depressed; head flat, snout rounded; limbs feebly developed; tail forming about one half total length, circular at base, but much flattened posteriorly. Dark brown, belly paler; back and sides often variously mottled with ocraceous or grayish. Length 3 to 4 inches.

This very active species is quite common about Washington. It is usually found in springs and rapid streams where it can conceal itself under stones and drift, but it is often to be observed lying in a sort of burrow in moss or grass roots near the water.

11. **Diemictylus viridescens** Rafinesque. Green Triton; Newt.

Body rounded and full, with a sharp vertebral ridge; head tapering to the rounded snout, and with three longitudinal grooves above; tail forming about one half the total length, flattened, tapering and with a more or less developed membrane-like fin. Front legs weak, hind legs stout. Above olive green or reddish of varying shades; lemon yellow below, with numerous scattered black specks; each side with a series of scarlet spots each surrounded by a black ring. The young (var. *miniatus*) are bright vermillion red with the spots on the sides rather indistinct. Length about 3½ inches.

While this species is not often collected, on account of its retiring habits and its very perfect color protection, it is common in most quiet ponds where there is growing vegetation. I have found the immature forms most abundant near Mt. Vernon.

Key to the species of Salientia.

a. Upper jaw toothless. - - - - - *Bufo lentiginosus*, 12.
aa. Upper jaw with teeth.
  b. Fingers and toes more or less dilated at the tips, this dilation forming a viscid disk; small species, not over 2 inches long (body measurement).
    c. Disks small; fingers not webbed.
      d. Toes broadly webbed. - - - - *Acris gryllus*, 14.
      dd. Toes scarcely webbed. - - *Chorophilus nigritus*, 15.
    cc. Disks well developed; fingers somewhat webbed.
      e. Color above clear green, with usually a few golden yellow specks. - - - - - - - *Hyla evittata*, 18.
      ee. Color above grayish, greenish, or brown variously striped or mottled
        f. Back with irregular lines forming an X, outside of which are other lines; general color brown. - *Hyla pickeringi*, 16.
        ff. Back uniform or mottled, general color grayish-green, gray, or brown. - - - - - - *Hyla versicolor*, 17.
  bb. Fingers and toes not specially dilated at the tips and not provided with adhesive disks; larger species, 2½ inches long or more.
    g. Sole of foot with a horny spade-like process; form squat and toad-like; hind legs weak. - - - *Scaphiopus holbrooki*, 13.
    gg. Sole of foot without a spade-like process; body frog-like; hind legs powerfully developed.
      h. Sides of back nearly smooth, the glandular thickening of the skin being obsolete. - - - *Rana catesbeiana*, 23.
      hh. Side of back with one or more well developed, thickened ridges of skin.
        i. Back with large distinct black spots, more or less regularly arranged.
          j. Outline of dorsal spots irregularly roundish. *Rana pipiens*, 19.
          jj. Dorsal spots squarish in outline and arranged in two fairly regular rows. - - - - *Rana palustris*, 20.
        ii. Back with small, indistinct spots or none.
          k. A conspicuous dark stripe from snout to front of eye. *Rana sylvatica*, 22.
          kk. No conspicuous dark stripe on side of head. *Rana clamata*, 21.

12. Bufo lentiginosus americanus (Le Conte). Toad.

Body heavy and awkward, the skin everywhere rough and warty; snout short and blunt; limbs shorter than in the frogs. Color sometimes ash gray, black, or even brick red but usually olive or brown with irregular blotches of dark brown; below, dirty yellow. Length 2½ to 5 inches.

The toad is an extremely common animal in our region. It appears early in the spring when its long continued, loud trill is one of the first evidences of the renewed activity of animal life. I have found them breeding in early March.

13. Scaphiopus holbrooki (Harlan). Spadefoot Toad.

Body toad-like, but a little less squat and clumsy; skin pustular but lacking the large warts of the preceding species; both pairs of legs short and stout; hand with two black callosities; foot with an elongated, compressed, spade-like process, black in color, with a sharp horny edge, and situated at the base of the inner toe. Brownish with a slightly paler band extending backward from the eye; sides sometimes mottled with ashy. Length about 3 inches.

There is a single record for this rare species within our limits. It is almost altogether subterranean in its habits, coming forth very rarely, and then at night. Its cries during the breeding season are said to be almost as loud and shrill as a steam whistle.

14. Acris gryllus (Le Conte). Cricket Frog.

Form frog-like; snout pointed; hind legs long, the heel reaching near to or beyond the snout when the leg is turned forward; fingers without web; toes webbed to near their tips; skin of back smooth or with large or small warts. Color variable and changeable; usually the upper surface is gray or brownish, there is often a large green dorsal patch and occasionally this color predominates; often there is considerable reddish; there is a dark triangle between the eyes and a white line from eye to arm; legs with cross bars; below, the color is whitish. Length 1¼ inches.

The species has been divided by Cope into two subspecies, *A. gryllus gryllus* and *A. gryllus crepitans*, which are of very doubtful validity. Both are found in abundance along the banks of streams and ponds, whence their continuous metallic cry comes almost without intermission during the season of activity, particularly during hot, sunshiny days.

15. Chorophilus nigritus feriarum (Baird). Striped Treefrog.

Body and legs rather slender; head rather pointed; fingers with at most only a rudiment of a web; toes with a slight web at their basal joints. Color varying from light ash to fawn and purplish brown; below, cream color; on the back there are three dark stripes, extending from the head to near the end of the body, of these the median sometimes forks near the middle of its length; upper surface of limbs barred or blotched. Length, 1½ inches.

This species is rarely seen except during its breeding season, when it is quite common. Its cry consists of two or three clear whistle-like chirps, like those of a young turkey, and, after one has learned to distinguish it from that of *H. pickeringi*, serves to betray its presence at once. In the spring of 1896 I collected thirty specimens in less than an hour from the gutters along the Conduit Road near Cabin John's Bridge.

16. **Hyla pickeringi** (Storer). Pickering Treefrog.

General form like the preceding but the body somewhat stouter; fingers and toes with well developed disks; fingers entirely unwebbed; toes half webbed; color ashy, brown, or reddish above; grayish or whitish below; on the back there is an irregular X of dusky; on the sides another dusky line runs parallel with the posterior limbs of the X, and on the head is a broad V-shaped mark; a dark line from snout, through eye, to back of head; limbs barred or mottled. Length about 1 inch.

This species is more common than the preceding and is occasionally met with throughout the summer. Its habits during the breeding season are easily studied, if one will go to some secluded woodland pool with a lantern, and the sight is well worth the trouble. Like many other species, this one has a large gular sac which it inflates when it sings. This sac is distended until it is almost as large as the body, and the skin is so stretched that it is nearly transparent. The muscles of the sides contract tremendiously and a clear whistle-like cry is produced, out of all proportion to the diminutive size of the frog. This cry differs from that of the preceding species in that the chirp is repeated monotonously time after time.

17. **Hyla versicolor** Le Conte. Common Treefrog, Chamæleon Treefrog.

Body rather stout and almost toad-like; head broader than long, snout rounded; fingers and toes with large disks; fingers with an evident web; toes webbed to near their tips; skin with numerous small warts above, granulate beneath. Gray-green, gray, or brown, with irregular, indistinct dark blotches and lines; below, white with bright yellow on groin and front and back of thighs. Length 1 to 2 inches.

Common but not often collected. Its "short, loud, trilled rattle" is heard throughout the summer in the evenings or during damp weather, individuals calling and answering from their perches on trees or fences.

18. **Hyla evittata** Miller. Swamp Treefrog.

Form similar to *Chorophilus nigritus* but with blunter snout and slenderer legs: fingers and toes with well developed disks; fingers distinctly webbed; toes webbed to the disks; skin nearly smooth. Color of adults varying from olive brown to bright leaf green; below, white slightly tinged with yellow; on the back there are often a few small yellow specks. Small specimens will often be found to have a more or less distinct white line extending about half way down the sides of the body from the snout, and both pairs of legs with a whitish band on the anterior surface. Length 1½ inches.

This frog which I first discovered near Mt. Vernon and regarded as *H. cinerea*, has since been shown by Mr. G. S. Miller, Jr., to be a distinct species. My specimens were found along the shore of Little Hunting Creek, October 15th, 1892. They were immature and were evidently looking for winter quarters and were hopping about everywhere among the damp leaves. I collected about fifty specimens, and on October 29th secured another lot. On visiting the locality late in the following spring, I found them among the cat-tails and other large aquatic plants some distance from the shore. Since then it has been observed in Swan Creek and Messrs. Miller and Preble secured full grown specimens from Fourmile Run and at Dyke. Its note is quite unlike that of any of our other frogs and consists of a series of high pitched, rattling croaks, which may remind one slightly of the shrill grunts of a very young pig.

19. **Rana pipiens** Schreber. Leopard Frog.

Form typically frog-like; head rather pointed, its length contained about three times in the body; tympanum about as large as eye; the dorso-lateral folds are rather prominent and between the two is a pair of indistinct, much broken, dorsal folds. Color ashy, olive, or bright green above, uniform white or yellowish below; upperparts with irregular, roundish, black blotches, margined with whitish, and arranged in two irregular rows; usually two spots between the eyes; legs with two rows of spots above. Length 3 to 4 inches.

A common inhabitant of the marshes about Washington and well known to the small boy as the "bloodynoun" or "bloodney." It is one of the first species to come forth in the spring and and one of the last to seek its winter quarters. Its notes appear to be somewhat variable, but during the breeding season the cry is a highly characteristic snoring croak or rattle.

20. **Rana palustris** Le Conte. Swamp Frog.

Very similar to the preceding species but with longer head and larger glandular folds; of the latter there are *distinctly two pairs*, the dorsolateral and the dorsal; the dorsal fold is continuous as far as the pelvic hump; the snout is usually obtuse and the form broader and flatter than in the preceding species. Color pale greenish brown or ashy above, yellowish white below; the blotches on the back are squarish and are arranged in two quite regular rows; sides with two rows of spots smaller than those on the back; hind legs conspicuously barred from the groin to the toes.

Fairly common, but usually living singly in cool pools or in the well-shaded grass along the banks of some spring-fed stream. Note probably similar to that of the leopard frog.

21. Rana clamata Daudin. Green Frog.

Head broad and flattened, snout rounded; eyes large and protruding; skin of back and sides more or less rough; a dorso-lateral glandular fold from eye to pelvic region, this sends a branch behind tympanum to front of arm. Color from bright green to brown, pale below; chin marbled with brown; back usually with indefinite small blotches of dark brown and similar, but larger, blotches on the sides. Length 3 to 4 inches.

This species bears a very close resemblance to young individuals of the bullfrog but may be distinguished at once by the presence of the glandular folds. It is quite common through the spring and early summer. I have found it in abundance in the series of pools between the canal and the river about 2½ miles above Georgetown. Its active movements and its strictly aquatic habits makes it a more difficult species to collect than most other species of this genus. Note, a series of three or four croaks irregularly descending in pitch.

22. Rana sylvatica Le Conte. Wood Frog.

Body slender and graceful; head broad; legs long; a dorso-lateral glandular fold from eye to end of body and another from mouth to front of arm. Color grayish or light chocolate brown, sometimes with greenish; beneath, whitish; a light streak from snout to vent, glandular folds often golden yellow and tympanum coppery, a black stripe from snout to front of eye, sides and back sometimes obscurely blotched and limbs barred.

An inhabitant of woodlands exclusively, this species is not often seen except during the breeding season when it sometimes occurs in great abundance in secluded ponds. During the remainder of the summer it prefers to live among the fallen leaves, where its colors correspond so perfectly with its surroundings that it is very effectually concealed. Note, a series of rapid, sharp croaks, all of abcut the same pitch.

23. Rana catesbeiana Shaw. Bull Frog.

Body large and heavy; head large and broad, snout rounded; legs long and strong; skin of back nearly smooth; no dorso-lateral folds; a small glandular fold from eye to front of arm, between this and the tympanum a sharp groove. Color yellow, green, brownish or deep brown, sometimes uniform but usually with indefinite blotches of brown; sides usually with marblings of brown; underparts white or yellowish. Length 4 to 8 inches, or total length 9 to 18 inches.

This, our largest frog, is very common along the larger and deeper watercourses about the city, wherever there is vegetation close to the waters edge to offer it a secure retreat. The thickets along the canal and the Eastern Branch are congenial lurking places from which it is to be taken only by frog hunters who go out at night and spear it from boats. Its roaring bass note is well known to all.

CLASS REPTILIA.

The reptilian fauna of this region includes, according to our present information, about forty species and subspecies. Of these, four are lizards, eight are turtles and the remainder are snakes. For the distinguishing characters of the two orders represented in our fauna the reader is referred to page 122. Below is given the

Key to the Species of Squamata.

a. LIZARDS—Sides of lower jaw not independently movable, united by a bony suture in front; shoulder girdle present; eyelids and tympanum usually evident; *limbs 4, in all our species.* Suborder SAURIA.

b. Scales on tail, or body, or both, keeled.

c. Keeled scales on tail only. *Cnemidophorus sexlineatus*, 25.

cc. Both tail and body with keeled scales. *Sceloporus undulatus*, 24.

bb. Body and tail with smooth scales only.

d. Limbs overlapping when pressed to side. *Eumeces fasciatus*, 26.

dd. Limbs not meeting when pressed to side. *Lygosoma laterale*, 27.

aa. SNAKES—Sides of lower jaw independently movable, united by ligament only; no shoulder girdle; no eyelids; no tympanum; *limbs entirely wanting.* - - - - - - Suborder SERPENTES.

e. Non venomous species; no pit between eye and nostril; no fangs.

f. None of the dorsal scales keeled.

g. Anal plate divided.

h. Scales on tail feebly keeled. - *Virginia valeriæ*, 46.

hh. Scales on tail smooth like those on body.

i. Scales in 13 rows, color brownish. *Carphophis amœnus*, 28.

ii. Scales in 15 to 17 rows.

j. Color grass green. - - *Liopeltis vernalis*, 31

jj. Color black or blotched light and dark brown.

k. Bluish black, with yellow collar. *Diadophis punctatus*, 29.

kk. Black, no collar; young blotched. *Bascanion constrictor*, 33.

gg. Anal plate not divided.

l. Black or brown, with narrow yellowish cross-lines. *Lampropeltis getulus*, 38.

ll. Brown or red, with large, dark-margined blotches.

m. Chestnut or olive brown, with about 50 rhombic blotches along the back, others on sides. *Lampropeltis rhombomaculatus*, 37.

mm. Red or brownish red, with a series of triple rings or dark bordered spots; head with yellow or red. *Lampropeltis doliatus*, 36.

ff. Dorsal scales more or less keeled.

n. Anal plate divided.

o. Scales in less than 18 rows.

p. Scales in 15 rows. - *Storeria occipitomaculata*, 44.

pp. Scales in 17 rows.

q. Color grass green. - - *Opheodrys aestivus*, 32.

qq. Color brownish. - - *Storeria dekayi*, 45.

oo. Scales in more than 18 rows.

r. Scales in 19 rows. - - *Regina leberis*, 41.

rr. Scales in 23 to 29 rows.

s. Snout recurved and keeled.

Heterodon platirhinos, 30.

ss. Snout normal, without recurved keel.

t. Ventral plates 130 to 160.

u. Upper labials 8; preocular 1.

Natrix sipedon, 39.

uu. Upper labials 9; preoculars 2.

Natrix bisecta, 40.

tt. Ventral plates more than 200.

v. Black, with obscure lighter blotches.

Callopeltis obsoletus, 35.

vv. Red, with dark bordered blotches.

Callopeltis guttatus, 34.

nn. Anal plate not divided.

w. Lateral stripe on 3d and 4th rows of scales.

Thamnophis sauritus, 42.

ww. Lateral stripe on 2d and 3d rows of scales.

Thamnophis sirtalis, 43.

ee. Venomous species; a deep pit between the eye and nostril; upper jaw in front, with large, erectile, perforated fangs.

x. Tail short, without a rattle, ending in a horny point.

Agkistrodon contortrix, 47.

xx. Tail provided with a rattle. *Crotalus horridus*, 48.

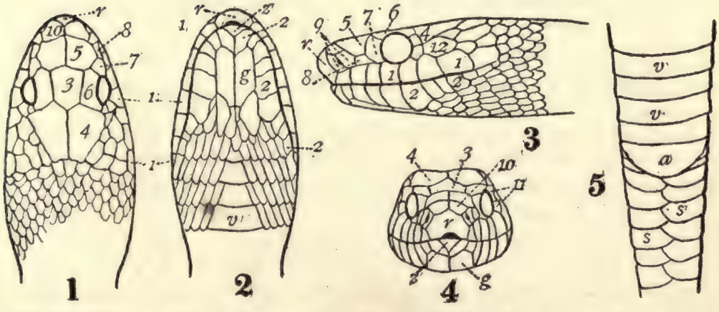

Fig. 2. Topography of a snake. *r*, rostral plate; *a*, anal plate; *v*, ventral plates; *s*, subcaudal plates; *1*, upper labials; *2*, lower labials; *3*, vertical plate; *4*, occipital plates; *5*, postfrontal; *7*, anteorbitals.

24. Sceloporus undulatus (Bosc). Pine-tree Lizard.

Head broad and flat, tapering to the short and rounded snout; tail slender, forming considerably more than one-half total length; plates on top of head rather large, a series of these above each eye; back of head with three plates, the median larger than the lateral and with a central translucent spot; scales of back and sides strongly keeled and pointed; those of the ventral surface smaller and smooth. Olive, brownish or nearly black, with undulating lines of dark brown across the back; a row of whitish spots on each side of the back; the tail is crosslined with black and the sides mottled with black and whitish. The males and, possibly sometimes the females, with brilliant green or blackish throat patches which are prolonged onto the arm and sides of the body. Length, 4 to 6 inches.

In our region this harmless and interesting lizard is very common in the higher and drier situations. It is often to be seen during the warm days of summer basking in the sunshine on some exposed rail fence, or log. The eggs are laid early in the summer and hatch in July. By the latter part of August the young begin to shift for themselves and leave the company of the adults.

25. Cnemidophorus sexlineatus (Linn.). Six-lined Lizard.

Long and slender, head pointed; top of head with a large median plate, on each side of which, over the eyes, are four smaller plates; ear about as large as eye; neck with two loose folds of skin below; front of thigh and under surface of hind leg with enlarged scales; scales of upper surface of body small, those below large and arranged in eight longitudinal rows; tail nearly twice as long as head and body and covered with large keeled scales. Olive or brownish or green, sides black, with three narrow stripes of yellow; a greenish stripe on back of thigh prolonged on sides of tail. Length, 6 to 10 inches.

As to the occurrence of this species within our limits there is some doubt, but it has been taken at no great distance both north and south so it will doubtless be found here sooner or later. It runs with great swiftness, is difficult to capture, and very little is known of its habits.

26. Eumeces fasciatus (Linn.). Blue-tailed Skink, "Scorpion."

Body slender or stoutish, head short, broad behind, snout rather blunt; ear smaller than eye; neck very short and with no loose folds of skin; tail longer than head and body; scales of back, sides and ventral surface about equal in size and smooth, but a row of enlarged scales on under side of tail. Young and medium sized specimens nearly black above, with five yellow lines running from the head to the middle of the tail; the median line forking on the head; the extremity of the tail is often bright blue. As the animal grows older, the stripes becomes obscure, the color of the body becomes olive or brownish, and the head becomes bright red. Length, 6 to 12 inches.

Under the name of "scorpion" this lizard is well known to the rural residents of our region, and by them is regarded as worthy of suspicion if not actually venomous. It is needless to say that there is no foundation for such a notion and the pretty animal is worthy of a better fate than usually is meted out to it. It is fairly common but its agility makes its capture difficult. They are very shy and timid and spend much of their time hidden under leaves and bark or in trees.

27. **Lygosoma laterale** (Say). Brown-back Lizard.

Body elongate, tail long and slender, limbs feebly developed; head short, nearly flat above, the perpendicular sides tapering to the snout; lower eyelid with a transparent spot; ear opening as large as eye; no folds of skin on neck; body covered with smooth scales. Olive or brownish above; abdomen greenish white; sides with a brown, white margined stripe running from eye to tail, below this, between the fore and hind legs may be a similar but narrower stripe. Length, 4 to 6 inches.

A rare species within our limits, only a few specimens having been collected in the neighborhood of Mt. Vernon and Marshall Hall. At Johnson's Gully I have taken three specimens, all of which were found under logs in rather damp situations.

28. **Carphophis amœnus** (Say). Ground Snake.

Head small, snout moderately elongated and rounded; vertical plate hexagonal; prefrontals small or wanting; postorbital single; upper labials, 5, eye over third and fourth; lower labials, 6; ventral plates, 112 to 131; scales smooth and glossy, in 13 rows. Above, rich chestnut brown; below, yellow or salmon. Length, less than one foot.

A not uncommon species, most often discovered by accident under some decaying log or sunken stone. It seems to prefer the rather cool and damp recesses of the thick woods, and so far as I know, is never found crawling about. I have found it frequently in Johnson's Gully and near Mt. Vernon.

29. **Diadophis punctatus** (Linn.). Ring-neck Snake.

Head rather distinct from body, flat; snout rather broad and projecting beyond lower jaw; upper labials, 7 or 8; lower labials, 8, the fifth the largest; ventral plates, 148 to 203; scales smooth, in 15 rows. Blue-black above, orange-red below; a cream colored ring around the neck just behind the head. Length, about 10 inches.

Not as common, perhaps, as the preceding, but to be looked for in the same localities. It has been taken at Mt. Vernon, Takoma Park, near Cabin Johns Bridge, etc. It can be recognized at once by its coloration.

30. **Heterodon platirhinos** Latreille. Hognose Snake; Spreading Adder.

Body thick and heavy; head broad and short; mouth large and much curved; rostral plate greatly developed, trihedral, pointed and upturned; upper labials, 8; lower labials, 11; ventral plates, 120 to 150; scales keeled, except those of the outer row which are smooth, arranged in 25, or rarely 23 rows. General color, brownish, reddish, or sometimes uniform gray or black; when not uniform there are from 20 to 30 dark dorsal blotches with an alternating series of dark blotches on the side and sometimes a third series low down on the sides; tail with bands of dark brown extending nearly around.

A common species, well known throughout the rural districts under the names, "black adder, spreading adder, blowing viper," etc. Its habits, which have given rise to the last two names, are exceedingly interesting and, as the snake is perfectly harmless, may be easily investigated. The various color phases, mentioned above, have been observed in our region. While they are regarded by the layman as indicating very distinct species they are known, by the herpetologist, to be nothing more than variations of the same thing.

31. **Liopeltis vernalis** (De Kay). Smooth Green Snake; Grass Snake.

Body and tail rather long and slender, the tail forming about one-third the total length; upper labials, 7, the eye over the third and fourth; lower labials, 8, the fifth the largest; scales smooth, arranged in 15 rows; ventral plates, 125 to 140; subcaudals, 69 to 95. Grass green above, greenish yellow below, throat and lower labials yellowish white. Length, 20 inches.

There are several records for the capture of this beautiful and inoffensive snake within our limits. In its habits it differs considerably from the next in that it seems to prefer to live among the grass and seldom if ever climbs above the ground.

32. **Opheodrys æstivus** (Linn.). Keeled Green Snake.

Body and tail very slender, the tail forming, usually, more than one-third the total length; neck slender; head narrow and high and somewhat swollen behind, the snout projecting considerably beyond the lower jaw; eyes large; ventral plates, 150 to 165; subcaudals, 110 to 135. Scales in 17 rows, keeled, except those of outer row and some of those of the second row. Grass green above, greenish white below. Length, 30 inches.

This species resembles the preceding very closely in color but may readily be distinguished by its more slender form and keeled scales. I have kept several specimens in confinement and have never seen one attempt to bite. They are often found twined about the limb of some bush, or running rapidly about through the limbs of trees or shrubbery in search of their food.

33. **Bascanion constrictor** (Linn.). Black-snake; Blue-racer.

Body long and slender, the tail constituting about one-fourth the total length; head distinct, long, pointed, high, the crown flat; eye in a groove which runs forward to the nostril; snout rather projecting and pointed; rostral plate high, upper anteorbital large, the lower very small; upper labials 8 to 10, the sixth very large; scales in 17 (15 to 19) rows, all smooth; ventral plates, 171 to 190; subcaudals, 80 to 110. Uniform black above, greenish white or lead color below; chin, lower jaw and upper labials with more or less white. The young are grayish olive, with a row of reddish brown, black bordered spots along the middle of the back, disappearing on the tail; sides with many specks and spots of brown; head mottled and specked; below, the color is greenish white with three or four specks of brown on each scale. They begin to assume the color of the adults when about 18 inches long. Length 6 feet.

This snake is very common with us and is often seen, especially among the undergrowth near streams and the margins of thick woods. It is perfectly harmless but when cornered will fight viciously. Its bite although severe is no worse than a bad scratch and will produce no more serious results.

34. **Callopeltis guttatus guttatus** (Linn.). Spotted Coluber.

Body rather elongate and slender, the tail forming about one-sixth the total length; head narrow, snout rounded; upper labials, 8; lower labials, 11; ventral plates, 214 to 236; subcaudals, 63 to 79; scales in 27 rows, those of the five central rows faintly keeled. Color above, light red becoming paler on the sides; back with about 40 irregular dark red spots each with a darker border; below these, on the side, is another series of spots, alternately larger and smaller, the larger alternating with the dorsal spots; lower surface checkered with black and yellow; head with dark bands, one through the eye to the corner of the mouth and onto the neck, another in front of this, and a third from the back of the head to the neck, Length, 4 feet.

There are two records of the capture of this snake within our limits, one at Wheaton, Md., the other at the U. S. Insane Asylum grounds. It is a southern species and is doubtless very rare here.

35. **Callopeltis obsoletus obsoletus** (Say). Allegheny Blacksnake.

Body moderately slender, the tail forming about one-fifth the total length; head rather broad, snout blunt; rostral plate broad, snout projecting; upper labials, 8 (rarely 9), the sixth and seventh the largest; lower labials, 11, the sixth the largest; scales in 27 (rarely 25) rows, all but the outer ones feebly keeled; ventral plates, 230 to 250; subcaudals, 53 to 86. Black or bluish black above, usually with obsolete lighter blotches, showing principally between the scales; below, the color is yellowish becoming darker posteriorly; lower jaw and throat white. Length, 3 to 8 feet.

This species is quite common, especially along Rock Creek and the Potomac River above Washington, I have seen it frequently on High Island and have taken two specimens at Takoma Park.

36. Lampropeltis doliatus (Linn.). House-snake; Milk-snake; Chicken-snake.

Head small; upper labials 7; lower labials 9 (occasionally 10), eye over third and fourth; scales smooth, in 21 rows (rarely 19, 20, or 22); ventral plates, 184 to 214. Length, 2 to 4 feet. The coloration is variable and on it numerous subspecies have been based; three of these occur within our limits.

a. Lampropeltis doliatus doliatus. (Linn.).

Bright red above, with 20 to 30 triple rings, of which two black ones enclose one of white or yellow; the black rings do not pass around the body, but the anterior of one set turns forward and joins the posterior of the preceding set on the ends of the ventral plates; sides with spots alternating with the dorsal blotches. Common in all parts of the District.

b. Lampropeltis doliatus triangulus. Cope.

Brownish red or gray above with a dorsal series of about 55 grayish brown or chocolate colored, black bordered blotches which do not reach the ventral plates; on each side are two, more or less confluent, rows of spots, blue black in color, the lowest row situated on the first and second rows of scales; a spot of yellow on the back of the head and a band of black bordered above by yellow running from in front of the eyes back onto the neck. There are seven records of the capture of this form within our limits.

c. Lampropeltis doliatus collaris. Cope.

Yellowish red with a series of reddish brown, dark bordered spots which do not extend further down than to the second row of scales; alternating spots black, extending from the second row of scales to, and including, the ends of the ventral plates; top of head with cross bands of yellow and brown or black; sides of head with black and yellow bands. This form seems to be rarer here than either of the preceding as there are but few records of its capture.

37. Lampropeltis rhombomaculatus (Holbrook). Brown Snake.

Head small, hardly distinct from the body, snout blunt; upper labials, 7; lower labials, 9; scales all smooth, in 21 rows; ventral plates about 205; chestnut brown above, becoming lighter on the sides; below, light reddish yellow, obscurely blotched with brown; on the back is a series of from 52 to 60 rhomboidal, dark brown blotches and on the sides a series of about 42 smaller, rather indistinct spots mostly alternating with those of the dorsal series; neck and back of head with a longitudinal stripe of dark brown on each side. Length, 30 to 46 inches.

Until within the last few years this snake was regarded as a great rarity but it is apparently becoming quite common in our region. It was noticed first near Alexandria, then at Rosslyn, and a few seasons later began to be taken on the northern side of the Potomac. It now seems to have extended its range as far north as Woodside. It is a very handsome snake, graceful, and usually quite good tempered.

38. **Lampropeltis getulus getulus** (Linn.). Chain Snake; King Snake.

Body rather slender, head small; snout rather compressed and projecting; upper labials, 7; lower labials, 10, the fourth and fifth the largest; ventral plates, 210 to 225; scales in 21 to 23 rows, all smooth. Black above, with about 33 continuous yellow lines running across the back and forking on the sides to join the branches from the lines in front and behind; a series of small black spots on the sides alternating with the large dorsal spots. Belly checkered with black and yellow. Length, 2 to 4 feet.

Judging from the records this snake must be quite common in this vicinity, but in the course of 10 years collecting I have never been so fortunate as to secure a specimen.

39. **Natrix sipedon** (Linn.). Water Snake.

Head rather narrow, pointed in front; upper labials usually 8, the sixth and seventh large, the eye over the fourth and fifth; lower labials, 10; scales strongly keeled, in 23 or 25 rows; ventral plates, 135 to 150; subcaudals, 60 to 75. Color variable, brownish; back and sides each with a series of large, square, dark blotches, transverse and alternating with each other; belly with brown blotches. Length 1 to 4 feet.

This disagreeable but perfectly harmless snake is very abundant along the banks of our streams and small ponds. The margin of the canal in the neighborhood of High Island is a favorite haunt.

40. **Natrix bisecta** Cope. Washington Water Snake.

Head rather narrow, the snout bluntish; upper labials, 9, eye over third and fourth; lower labials 9; scales all keeled, in 25 rows; ventral plates, 143; subcaudals, 67. Olive brown above, with a row of small longitudinal blackish spots on the sides and two very indistinct longitudinal stripes on the anterior half of the body; head with three light spots above; belly nearly plain. Length, 13 inches.

The type specimen, which remains unique, was collected about 15 years ago in the grounds of the central station of the U. S. Fish Commission. In this specimen the rostral plate is divided into two by a vertical fissure, a character which must be regarded as accidental.

41. **Regina leberis** (Linn.). Striped Water Snake.

Head small, little distinct from body, snout rounded; upper labials, 7, eye over third and fourth; lower labials, 10, the fifth and sixth largest; scales all keeled, in 19 rows; ventral plates, 140 to 150; subcaudals, 70 to 80. Chestnut brown above with three longitudinal narrow stripes of brownish black, one on the median line and one on the fifth row of scales; belly yellow with two brown bands. Length, 2 feet.

Quite common along the banks of our shallow streams and ponds. It appears very early in the spring and is never found far from the water.

42. **Thamnophis sauritus** (Linn.). Riband Snake.

Body rather elongate, head distinct; tail forming about one-third total length; upper labials, 7 or 8; lower labials 10, the fifth and sixth large; scales distinctly keeled, in 19 rows; ventral plates, 150 to 180; subcaudals, 100 to 120. Above, the color varies from light chocolate to almost black, relieved by three stripes of greenish white or yellow; the dorsal stripe lies on the median row of scales and the adjacent half of the next row on each side; the lateral stripes are on the third and fourth rows above the ventral plates. The lower surface is greenish white without markings. Length, 2 to 3 feet.

This snake is quite abundant about Washington and is to be looked for in almost any locality. It is most common, however, in low meadows or near the edges of streams.

43. **Thamnophis sirtalis** (Linn.). Common Garter Snake.

Body varying from slender to quite stout, head distinct; tail forming about one-fourth or one-fifth the total length; upper labials, 7 or 8, eye over third and fourth; lower labials, 10; scales keeled, in 19 rows; ventral plates, 140 to 180; subcaudals, 50 to 90. Upper surface varying from olive to dark brown as a ground color; a narrow, indistinct, greenish yellow line along the back, on each side of which are three series of small indistinct dark brown spots, about 70 in each row from head to vent; sides and belly greenish, but there is a lighter tint on the second and third rows of scales; ends of ventral plates each with a black blotch. Length, 2 to 3 feet.

Thamnophis sirtalis dorsalis (Baird and Girard).

A form of the above which has been reported from this locality differs in having the dorsal stripe broad and two rows of small distinct spots on each side.

The garter snakes are perhaps the most familiar and well-known of all our snakes and are to be met with in almost every part of the region. Frogs form an important part of their diet and consequently they are most abundant in moist situations and near the water. When cornered they will fight savagely but their bite is perfectly harmless.

44. **Storeria occipitomaculata** (Storer). Red-bellied Snake.

Snout short and blunt; upper labials, 5 to 6, growing larger posteriorly, eye over third and fourth; lower labials, 6 or 7; scales in 15 rows, all keeled; ventral plates, 117 to 128; subcaudals, 43 to 50. Olive brown to reddish gray, sometimes uniform, but usually with a paler dorsal band bordered by blackish dots; sides with obscure dots; back of head with three pale blotches; belly salmon red. Length, 12 inches.

Not uncommon; I have collected it at Johnson's Gully, Mt. Vernon and at various points along the Potomac above Georgetown.

45. **Storeria dekayi** (Holbrook). DeKay's Snake.

With the general form and proportions of the preceding; upper labials, 7, eye over third and fourth; lower labials, 7, fourth and fifth large; scales in 17 rows, all keeled; ventral plates, 120 to 145. subcaudals, 40 to 60. Grayish brown, with a clay colored dorsal band, bordered by a row of brown or black dots (occasionally a second series lower down); a dark patch on each side of the back of the head; belly grayish, yellowish or reddish. Length, 12 inches.

This species is perhaps more common than the preceding and is less retiring in its habits. I have taken it in some numbers at the localities just mentioned.

46. **Virginia valeriæ** (Baird and Girard). Valeria's Snake.

Head small, narrow, and relatively high; snout pointed and the sides of the head perpendicular; upper labials, 6, the fifth largest, eye over third and fourth; lower labials, 6; scales in 15 rows, those on the tail feebly keeled, all the others smooth; ventral plates, 111 to 128; subcaudals, 24 to 37. Yellowish or grayish brown above, with usually scattered dots forming a faint line on each side of the back; a faint light line along the middle of each scale; beneath, the color is uniform dull yellow. Length, 8 to 10 inches.

Not an uncommon species in thick woods,

47. **Agkistrodon contortrix** (Linn.). Copperhead.

Stoutish but with rather slender neck. Head large, flat, triangular, and with the sides in front of the eyes perpendicular; upper labials, 7 or 8, none of them reaching the eye; lower labials, 10; scales in 23 rows, all keeled; ventral plates, 150 to 155; subcaudals, 42 to 52, all entire except the last 8 to 18. Hazel brown, sides with a series of 15 to 25 ⅄ shaped chestnut brown blotches which extend to or across the vertebral line; top of head coppery-red; sides of head and end of snout cream colored; belly yellowish, with 25 to 45 dark spots on each side. Length, 1½ to 3 feet.

This serpent is still not uncommon notwithstanding the efforts to exterminate it. It is a frequenter of cool, damp woods and generally chooses a place where rock debris will afford it a ready refuge in time of danger. Although its bite is extremely dangerous, it is not often inflicted, the reptile seeming to prefer to run away rather than fight. I have taken two or three large specimens alive which showed no disposition to bite until after their capture.

48. **Crotalus horridus** (Linn.). Common Rattlesnake.

Form of head and body like the preceding species but with the end of the tail provided with a jointed rattle. Upper labials, 12 to 16, none of them touching the orbit; lower labials 13 to 18; scales in 23 to 25 rows, all, except those of outer row, keeled; ventral plates, 165 to 175;

subcaudals, 19 to 25. Ground color above, cream color to yellowish or very dark brown, with three rows of confluent irregular brown spots forming zigzag cross blotches, bordered with sulphur yellow; tail black; upper lip sulphur yellow; lower lip lighter; belly yellow with some mottlings and sprinklings of black. Length, 2 to 5 feet.

The evidence as to the occurrence of the rattlesnake within our limits is not altogether satisfactory, yet it is of such a character as to make it seem extremely probable that the species is still to be found about the rock slides along the Potomac River above the city.

Key to the species of Chelonia.

a. Tail long, about equal to the plastron. - *Chelydra serpentina*, 49.

aa. Tail much shorter than the plastron.

  b. Marginal plates, 22.

    c. Hinder lobe of plastron considerably more than ½ as wide as the carapace. - - - - *Kinosternon pennsylvanicum*, 50

    cc. Hinder lobe of plastron not more than ½ as wide as the carapace. *Aromochelys odorata*, 51.

  bb. Marginal plates, 24.

    d. Plastron without hinge, immovably joined to the carapace.

      e. Plates of carapace nearly or quite smooth.

        f. Carapace without round yellow spots.

          g. Neural and costal plates alternate. *Pseudemys rubriventris*, 52.

          gg. Neural and costal plates arranged in 4 nearly straight rows across the back. - - - *Chrysemys picta*, 53.

        ff. Carapace with many round yellow spots. *Clemmys guttatus*, 54.

      ee. Plates of carapace rough, each one with low, concentric ridges. *Malaclemmys centrata*, 55.

    dd. Plastron with a hinge across its middle and united by a movable suture with the carapace. - - *Terrapene carolina*, 56.

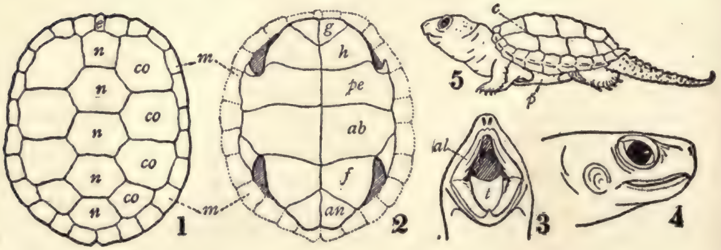

FIG. 3. Topography of a turtle. *e*, nuchal plate; *n*, neural plates; *co*, costal plates; *m*, marginal plates; *g*, gular plates; *h*, humeral plates; *pe*, pectoral plates; *ab*, abdominal plates; *f*, femoral plates; *an*, anal plates; *c*, carapace; *p*, plastron; *al*, alveolar surface; *t*, tongue.

49. **Chelydra serpentina** (Linn.). Snapping Turtle.

Shell high in front, low and notched behind, and with three keels, a median and two lateral, which become obsolete with age; body heaviest forward; head and neck very large, the snout narrowed forwards; jaws strongly hooked and very powerful; tail long, its upper margin with a crest of horny compressed tubercles, its ventral surface with two rows of moderate scales; plastron small, cross shaped, with nine plates besides the very narrow bridge; claws, 5–4, strong; soft skin everywhere with wrinkles and warts; fore-arm, hands, and feet with large scales. Carapace dusky brown or black, head and neck brown, plastron and soft skin whitish or yellow. This species, it is said, sometimes attains a length of 4½ feet, but the largest specimen which I have seen in this locality was 2 feet long. It is fairly common in the marshes, ponds, and shallow waters about Washington.

50. **Kinosternon pennsylvanicum** (Bosc). Eastern Mud Turtle; Skillpot.

Body oval; carapace with three indistinct keels, evident in the young but entirely disappearing in the adult; plastron large, almost filling the opening of the carapace, its anterior and posterior lobes movable on the fixed central portion, the anterior lobe rounded and with a single gular scute, the posterior lobe notched behind; head of moderate size. Males with two patches of sharp edged scales on the hind legs and the tail ending in a horny point. Carapace horn color or brown, plastron yellow or brown; soft skin above, brownish with yellow spots; head and neck with yellow stripes; skin of lower surfaces yellow. Length, about 5 inches.

Fairly common in the marshy parts of the District.

51. **Aromochelys odoratus** (Bosc). Marsh Turtle; Stink Pot.

Body oval but much narrower in the adults than in the young; the carapace with a more or less prominent median keel; plastron narrow, lacking much of filling the opening of the carapace, only its anterior lobe movable; gular scute single; posterior lobe of plastron notched behind; head large, snout projecting, jaws strong, the lower one hooked. Tail of males coiled at tip and furnished with a small nail. Carapace brownish or horn color, often spotted or striped with dark brown; upper surfaces of head, neck, and limbs brown, the lower surfaces paler; plastron yellow; head with two yellow stripes on each side. Length, 5 inches.

This disagreeable and repulsive turtle is often met with in the marshes about the city and can usually be obtained with ease at Four Mile Run or the Bennings Swamp. It is sometimes taken by the angler on his hook.

52. **Pseudemys rubriventris** (Le Conte). Red-bellied Terrapin; Slider.

Body oval, less rounded and less elevated in the adults than in the young; alveolar surface of jaw broad and with a longitudinal, tuberculated ridge; jaws coarsely serrated, the upper with a prominent hook on each side of the median notch; a row of large scales along the outer edge of the fore feet; neck with scales; loose skin between legs scaleless. Color exceedingly variable, dusky with irregular red markings above; marginal plates with much red; plastron red or partly yellowish; head and neck brown with reddish lines. Length, 6 to 8 inches.

A rather common species and probably the best known, as it is brought in numbers to our markets and sold for food. It is to be looked for in the same localities as the preceding.

53. **Chrysemys picta** (Hermann). Painted Turtle.

Shell broad and low, the surface very smooth, and with no traces of a keel; plates of carapace arranged in four, nearly straight, transverse rows; upper jaw with a small tooth on each side of the median notch, alveolar surface narrow and with a low, smooth ridge on each side for about half its length; plastron broad and flat, truncated behind. Greenish black above, the plates margined with paler; marginal plates marked with bright red; plastron yellowish, often blotched with brown; head and neck with yellow stripes. Length, 4 to 5 inches.

Our most common species. It occurs in great numbers in the low marshes along the river and the Eastern Branch. An energetic collector once brought me fifty specimens of this turtle which he had secured in one afternoon in the marsh near Bennings.

54. **Clemmys guttatus** (Schneider). Speckled Tortoise.

Shell low, broad, and without traces of keel except sometimes in the young; nuchal scute very narrow; plastron large, its posterior border slightly emarginate; upper jaw slightly notched in front, alveolar surface very narrow; legs and feet all covered with scales, those of the front limbs large and overlapping; tail long, that of the male bringing the vent beyond the end of the carapace. Color black above, often with reddish-brown tints; each scute with from one to twelve round orange spots; plastron red, orange, and black, the latter usually predominating; head black, with orange dots, neck and soft skin about legs with more or less red.

Very common in about the same localities as all the preceding.

55. **Malaclemmys centrata** (Latreille). Diamond-back Terrapin.

Carapace broad, rather depressed and rising gradually to the central ridge, the plates which cover it always with numerous concentric, low ridges; upper jaw not notched in front, alveolar surface smooth. Greenish or almost black, plates of both carapace and plastron usually with dark concentric lines. Length, 4 to 12 inches.

There is a single record for this turtle within our limits and was probably based upon some individual which had escaped from the market.

56. Terrapene carolina (Linn.). Box Turtle.

Shell broadly oval, high and very convex, heavy and solid; posterior portion of carapace with a well-defined keel in the young, this more or less evident in the adults; plastron large, tightly closing the opening of the carapace, consisting of two lobes movable by hinges on each other and the carapace; upper jaw with a median hook but no notch, alveolar surface narrow; limbs and feet scaly; tail short. The colors of the carapace are yellow and brown or black, variously arranged and with sometimes one and sometimes the other color predominating; the young have a single yellow spot on each scute; plastron with black and yellow; head, neck, limbs, and tail black, with yellow spots. Iris of males red, and the skin of the neck and legs more or less suffused with orange. Length, about 5 inches.

Abundant in the woods everywhere about the city. On a single short walk in the early morning I have found 8 or 10 of this species.

VOL. XV, PP. 147-149 JUNE 20, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW SPECIES OF POISONOUS SUMACHS FROM THE STATES OF RHODE ISLAND AND FLORIDA.

BY EDGAR A. MEARNS.

Mr. Gerrit S. Miller, Jr., recently directed my attention to marked variations in the *Rhus*, known as Poison Oak and Poison Ivy growing in the vicinity of his residence in Virginia. As I justifiably considered myself to be practically immune to the poison of these plants, comparisons were commenced, in the course of which it developed that the *Rhus radicans* of Linnæus (Poison Ivy), an extremely variable species of the North, meets the range of *Rhus toxicodendron* of Linnæus (Poison Oak), a southern species, in Virginia and the District of Columbia. *Rhus toxicodendron* Linnæus appears to be confined to the Southern States. It is a shrub having crenately-lobed, very pubescent leaflets.

Seeds of *Rhus radicans* which I collected in Virginia, in November, 1901, were found to differ from those gathered on the island of Rhode Island, near Newport, during the same month, as well as from those labelled *Rhus toxicodendron* Linnæus by Mr. E. S. Steele, whose specimens (Nos. 364,079 and 364,080, U. S. National Herbarium) were collected in the District of Columbia, and kindly lent me, together with other specimens of *Rhus*, by the authorities of the United States National

Museum. To others I am indebted for much additional material from private herbaria; also to Mr. Gerrit S. Miller, Jr., and Mr. Charles Louis Pollard, for special assistance. In the National Herbarium is another entire-leaved form, from Florida, related to the Rhode Island species.

Prof. Amos Eaton, in the 4th edition of his Manual,* describes the "poison vine" or "poison ash" under the specific name *toxicodendron*, and gives the following: "Var. *radicans*, (poison ivy) stem climbing and rooting: leaflets broad, entire, or with scattered teeth. Var. *quercifolium*, (poison oak) erect, low: leaflets variously sinuate-lobed. Var. *microcarpon*, leaflets oblong-oval, long-acuminate, sub-rhombic: fruit very small." Neither these names and descriptions nor those of later writers, *Toxicodendron vulgare* Miller included, are applicable to the entire-leaved littoral forms occurring on Rhode Island and in Florida, which are described below.

Rhus littoralis sp. nov.

RHODE ISLAND SUMACH.

Type.—From Newport, Rhode Island. No. 403,300 U. S. National Herbarium. Specimen consisting of three parts: (1) a botanical sheet with branch, leaves, and fruits (September 10, 1901); (2) a quantity of drupes; (3) central stem (all from the same plant), 2 meters in height, cut in lengths of a little less than 4 decimeters each (November 28, 1901). Collected by the author. Original number, 233.

Description.—An erect, woody shrub, 2 to 4 meters in height, with stem 1 to 2 dm. in circumference. Wood fine-grained and white. Stem terete, with scattered aërial rootlets near the ground; branches longitudinally ridged; bark gray or reddish brown on new growth; young shoots and buds covered with a brown pubescence. Leaves thick, petioled, 3-foliate, resinous spotted, and with brownish pubescence on veins; petiole of leaf 50 to 200 mm., of lateral leaflets 1 to 10 mm., and of the terminal leaflets 10 to 30 mm.; leaflets oblong-lanceolate, inequilateral, rounded at base, and acute at apex, with margin entire, 50 to 100 mm. in length by 20 to 60 mm. in breadth. Flowers green, in loose axillary panicles. Fruit a globose drupe, consisting of a flattened, striated, 1-celled stone; a persistent, white, lobed pericarp; with a greenish or yellowish fugacious outer investment which at first is very pubescent and afterwards smoothish. In plate III are shown the dessicated pericarps of four species as they appear in winter after the epicarp has separated

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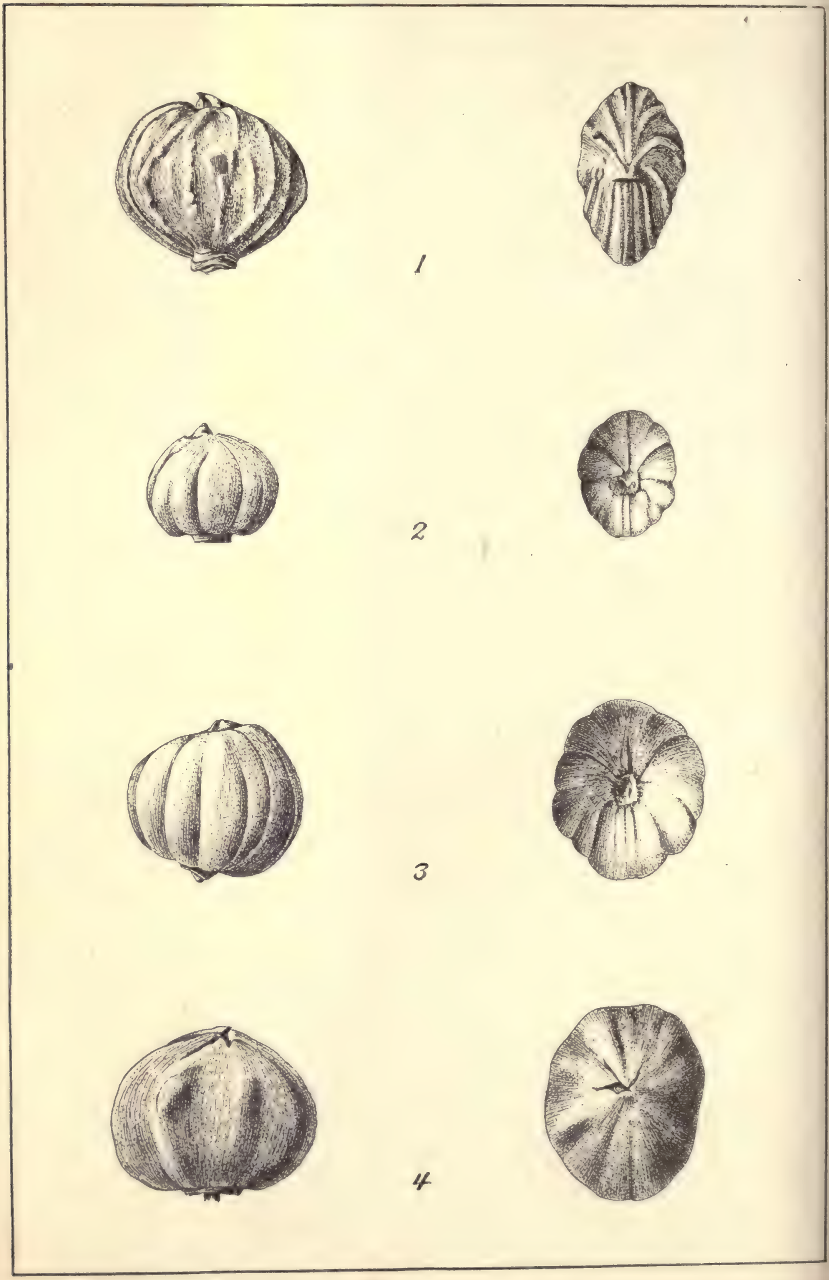
*A Manual of Botany for the Northern and Middle States of America, etc., Albany, 1824, p. 428.



SEEDS OF FOUR SPECIES OF RHUS.

from the sarcocarp and disappeared. The surface of the indurated sarcocarp conforms to that of the endocarp, appearing quite smooth in *Rhus toxicodendron* (fig. 4) globosely lobed (like a canteloupe) in *R. littoralis*, (fig. 3) and *R. floridana* (fig. 2), and flattened (like a peach-stone) in *R. radicans* (fig. 1).

Rhus floridana sp. nov.

FLORIDA SUMACH.

Type.—No. 387,083 U. S. National Herbarium; collected by A. S. Hitchcock, at Alva, Lee County, Florida. Sheet consisting of two twigs with leaves and fruitage.

Description.—Similar to *Rhus littoralis*, but with leaves much thinner and smoother, and with drupe (pl. III, fig. 2) much smaller, with epicarp shining and glabrous. Flowers small, green, in loose axillary panicles. Petioles as in *R. littoralis*. Entire plant not seen.

VOL. XV, PP. 151-152 JUNE 20, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW BAT FROM COLOMBIA.

BY MARCUS W. LYON, JR.

The writer has recently had opportunity to examine a fine series of skins and skulls of *Vampyrops lineatus* collected by Mr. Wm. T. Foster, in Paraguay, the type locality of the species. A comparison of the Colombian bat, previously assumed to be *V. lineatus** with these topotypes, shows the former to be specifically distinct, though closely related to true *lineatus*. Until now, apparently no name has been proposed for the Colombian bat.

Vampyrops umbratus new species.

Type from San Miguel, Colombia. No. 8180, Bangs' Collection in Museum of Comparative Zoology. Skin and skull of adult male, collected June 8, 1898, by W. W. Brown, Jr. Original No. 234.

General characters.—Allied to *Vampyrops lineatus* (E. Geoffroy); differs in having a larger skull, darker coloration and with the light markings on the face and back less clear and less sharply defined.

Description of type.—Color above, seal-brown (Ridgway), bases of the hairs somewhat lighter, approaching a dark hair- or broccoli-brown; below, practically the same, but duller and a little lighter. A fine whitish line about 1 mm. in width runs from the back of the neck along the middle of the back to the edge of the interfemoral membrane. The face is marked by two stripes of light broccoli-brown 1–1.5 mm. in width, one on each side extending from the posterior base of the nose-leaf, up over the eye, to nearly as far back as the occiput. The two lower face markings from each angle of the mouth to each ear, are scarcely definable.

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*Robinson and Lyon, Proc. U. S. Nat. Mus., XXIV, p. 149, 1901.

Hair covers the forearm above for about two-thirds its length, extending out on the membrane for about 5 mm. The underside of the forearm is scantily covered with short hairs for about the same distance and the hair extends about 10 mm. on the membrane. Interfemoral membrane scantily covered above and below, with hairs like those on the back and belly, the hairs forming a fringe on the posterior border. Length of hair on back 8 mm., on belly 5 mm.

Skull.—Like that of *Vampyrops lineatus*, but larger in every way and with heavier teeth. The last upper molar is different in shape, being disproportionately wider, from side to side, than the same tooth in *V. lineatus*.

Measurements of type.—(The figures in parenthesis are those of an adult specimen from Paraguay: Wm. T. Foster, No. 361). Forearm, 43 (46): longest finger, 104 (102); tibia, 15 (17); calcar, 5 (7); foot, 12 (12); greatest length of skull, 27.2 (25); zygomatic breadth, 15.6 (15); front of upper canine to posterior edge of last upper molar 10.4 (8.2); width of last upper molar, 1.2 (0.8); distance between outer angles of second upper molars at alveoli, 11.2 (10.4); greatest length of mandible, 18 (17).

Remarks.—*Vampyrops umbratus* needs comparison with no other species than *lineatus*. It is darker throughout, has a slightly smaller body and a distinctly larger skull. The color of *lineatus* is a broccoli- or hair-brown, in contrast to the seal-brown of *umbratus*. The stripe down the back of *lineatus* is pure white and from two to three times the width of the whitish stripe down the back of *umbratus*. The face stripes in *lineatus* are white and distinct, in *umbratus* they are a light broccoli-brown and ill-defined, especially the lower markings. The nose-leafs and ears show no apparent differences in the dried skins of the two species.

Vampyrops umbratus is represented by three specimens, all in Bangs' Collection in Museum of Comparative Zoology; the type, No. 8180, from San Miguel, No. 8300, from San Antonio, and No. 8301, from Palamina, Colombia. The two latter are entirely uniform with the type in point of size and coloration. Unfortunately they are not accompanied by skulls.

VOL. XV, PP. 153-156 JUNE 20, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

The Generic names of the Peccaries, Northern Fur Seal, and Sea Leopard.

Dr. Gill's ruling* about the names of the Peccaries surely introduces a very dangerous principle, which might carry us a great deal further than at first appears. *Tayassu* (1814) and *Dicotyles* (1817) each contain exactly the same species, and the later one should therefore be considered as a full synonym of the earlier. To permit any later restriction of the synonymic name to reinstate it as a valid one side by side with the earlier would be a plan quite opposed to the usual custom, and one fraught with the danger of much further disturbance to nomenclature.

Nothing is more likely to introduce confusion and doubt into nomenclatural decisions than any paltering with the good old principle of "once a synonym always a synonym."

Consequently I think Dr. Merriam perfectly correct in his contention that *Tayassu* and *Dicotyles* are strictly synonymous, but Fischer's *Notophorus* † introduces a new element into the case.

In giving this name, Fischer no doubt intended merely to replace his earlier but barbarous *Tayassu* by a classical term, but he happened to mention only one species as belonging to it, viz: "*Sus tajassu* Lin. Gmel."

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*General Notes, supra p. 38.

†G. Fisch. Mem. Soc. Moscow, V, p. 418, 1817.

This therefore would not only be its type, but would by elimination restrict *Tayassu* and *Dicotyles* to the other species mentioned in the respective original descriptions of those genera. Dr. Merriam's *Olidosus* would thus not be required.

But while Linnaeus's *Sus tajacu* was the collared Peccary, Fischer's *Sus tajassu* was, as is clearly shown by the synonymy in his Zoognosia,* the whitelipped species, and that, therefore, must count as the type of *Notophorus*, and by elimination bring *Tayassu* on to the true *T. tajacu.* We should thus have *Tayassu*, Fisch.

Subgenus *Tayassu*, Fisch. (Syn. *Dicotyles*, Cuv.) Species *T. tajacu* (type), *angulatus*, *torvus*, etc. Subgenus *Notophorus*, Fisch. (Syn. *Olidosus*, Merr.) Species *T.* (*N.*) *albirostris* (type) and *T. a. ringens.*

Doctor Allen has taken the same view about the principle of full synonyms in the case of the Eared Seals, when showing† "that the genus *Otoes*, Fischer, 1817, is an exact synonym of *Otaria* Péron, 1816," and so far I fully agree with him.

But I would venture to ask if the principle on which the name *Callorhinus* Gray, 1859, is rejected ("preoccupied by *Callirhinus*, Blanchard, 1850") is not now an obsolete one, and should we not therefore adopt that name.

The logical outcome of the non-emendation system, nearly universally adopted in America, and now unreservedly accepted here by myself and others, is that unless two names are entirely alike, the earlier does not preoccupy the later, however closely they may resemble each other. Even if I did not go so far as in the case next following, I should still consider *Callorhinus* and *Callirhinus* as "permissible variants" of one compound, and each as valid as *Picus* and *Pica.*

The extreme of this principle is reached in the case of the Leopard Seal, now commonly, but for two reasons erroneously, called *Ogmorhinus*, (Peters, 1875).

Firstly, its original and still well-known name was spelt *Stenorhinchus* on its first publication in 1826,‡ and I hold that the name is not invalidated by the *Stenorhynchus* or *Stenorynchus* of earlier authors.

Secondly, it may be pointed out, for the benefit of those who might refuse to accept *Stenorhinchus* that Peter's *Ogmorhinus* of 1875, can in no case stand, as the genus had already been renamed *Hydrurga* by Gistl in 1848.‖

To recapitulate, I consider that the two subgenera of the Peccaries should bear the names of *Tayassu*, Fisch., and *Notophorus*, Fisch., the Northern Fur Seal that of *Callorhinus*, Gray, and the Sea Leopard, *Stenorhinchus*, F. Cuv.—*Oldfield Thomas*

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*III, p. 285.

†Bull. Am. Mus. N. H., XVI, p. 116, 1902.

‡F. Cuv. Dict. Sci. Nat. XXXIX, p. 549, 1826.

‖Naturg. Thierr, p. XI, 1848.

Note on the Vespertilio incautus of J. A. Allen.

In my revision of the North American Bats of the family Vespertilionidæ (North American Fauna, No. 13, October 16, 1897), I consider the Texan *Vespertilio incautus* of J. A. Allen (Bull. Amer. Mus. Nat. Hist., VIII, p. 239, November 21, 1896), as identical with the Mexican bat previously described by the same author as *Vespertilio velifer*. Mr. Vernon Bailey has recently asked me to identify eight bats of this group which he collected in the summer of 1901, at Carlsbad, New Mexico. They prove to be the same as *incautus*; and, after examining all the material now available (including the original series of *incautus*, kindly loaned by Dr. Allen), I regard this form as worthy of recognition by name. It should stand as *Myotis incautus* (J. A. Allen), and may be distinguished from *M. velifer* by its more pallid coloration.—*Gerrit S. Miller, Jr.*

Note on the Chilonycteris davyi fulvus of Thomas.

In November, 1892, Mr. Oldfield Thomas separated the Mexican barebacked bat from the South American form under the name *Chilonycteris davyi fulvus* (Ann. and Mag. Nat. Hist., 6th ser., X, p. 410) on account of the small size and "briliant fulvous chestnut" color of some specimens from Las Peñas, Jalisco. Two years later (Bull. Amer. Mus. Nat. Hist., VI, p. 248, August 3, 1894), Dr. J. A. Allen showed that these bats are dichromatic, and that the red phase is not characteristic of the Mexican form. He proposed, therefore, to place the name *fulvus* as a synonym under *davyi*.

Having recently examined a considerable number of specimens of *Dermonotus* from Mexico, as well as a topotype of *D. davyi* and several individuals of the same species from Dominica, I find that *D. fulvus* is a well-marked form, characterized by its noticeably smaller, narrower skull. In the Trinidad specimen the greatest length of skull is 15.8 mm., in those from Dominica, 15.8–16 mm., while in the Mexican series it never exceeds 15 mm.—*Gerrit S. Miller, Jr.*

Parus inornatus griseus renamed.

Parus inornatus griseus (Ridgway, 1882), the name in current use for the Gray Titmouse, cannot, according to our present interpretation of the American Ornithologists' Union Code of Nomenclature, be continued, since there is a much older *Parus griseus* (Müller, Zool. Danicæ, 1776, p. 34). It is therefore proposed to rename the Gray Titmouse *Parus inornatus ridgwayi*.—*Charles W. Richmond.*

The Hooded Warbler breeding near Washington, D. C.

Although the Hooded Warbler (*Wilsonia mitrata*) has been for a very few years known to be a regular but rare summer resident of the wooded slopes on the Virginia side of the Potomac near this city, there has been apparently no record of its nesting. On June 8, 1902, Mr. J. H. Riley and the writer took a young bird, evidently just out of the nest, on the laurel-covered slope of a run draining into the Potomac near Langley, Fairfax County, Virginia, *i. e.*, nearly opposite Cabin John, Maryland. It was accompanied by both parents. Mr. Riley has observed the species resident near Falls Church, Virginia, in May, June and July; and one or two individuals have been taken in early summer near Great Falls.—*William R. Maxon, Washington, D. C.*

VOL. XV, PP. 157-158 JUNE 25, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW BIRDS FROM TRONG, LOWER SIAM.*

BY CHARLES W. RICHMOND.

Among the birds collected by Dr. W. L. Abbott in the province of Trong, Lower Siam, and forwarded to the U. S. National Museum, are two apparently new forms which are here described. The first, a species of *Stachyris*, was sent for determination to Dr. R. Bowdler Sharpe, who considered it new and nearly related to *S. chrysœa.* The latter species is not represented in the Museum collection, hence a direct comparison has not been made.

Stachyris chrysops new species.

Type.—Adult male, No. 160,566, U. S. National Museum, summit of Khow Nom Plu, 3000 feet, Trong, Lower Siam, February 22, 1897, Dr. W. L. Abbott. Nape, back, scapulars, outer margins of wing and tail feathers, upper tail-coverts and rump, brownish olive green, paler and more yellowish on the latter; forehead, orange-ochraceous; crown and occiput ochre yellow, streaked with black; lores and a narrow rictal streak, black; throat, breast, abdomen, and bend of wing, ochre yellow, deeper on the throat; under tail-coverts, sides of body, sides of neck and ear-coverts, brownish wax yellow; under wing-coverts, axillaries, and inner margins of wing feathers, pale Naples yellow; tail grayish olive green; wing feathers grayish black.

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Length (in the flesh), 121 mm.; wing (in skin), 50 mm.; tail, 47; tarsus, 18.5; culmen, 12 (bill, from gape, 15).

"Iris red; feet yellowish brown; upper mandible black; lower mandible leaden, pink at base."

Oreocincla horsfieldi affinis new subspecies.

Type.—Adult male, No. 169,982, U. S. National Museum, Khow Nok Ram, 3000 feet, Trong, Lower Siam, January 13, 1899, Dr. W. L. Abbott. Similar to *O. horsfieldi*, but has a smaller bill, longer wing, somewhat brighter colors, is more heavily mottled above, and has a different wing formula. According to Seebohm the "second primary is intermediate in length between the fifth and sixth, or sixth and seventh" in *O. horsfieldi**, which statement agrees with a specimen in the National Museum collection; the fourth and fifth primaries are equal and longest. In the new form the second primary falls between the third and fourth, with the third longest, thus agreeing with *O. varia*.

Length (in flesh), 267 mm.; wing, 142; tail, 93; tarsus, 34; culmen, 23 (bill, from gape, 30.5); "Iris, dark brown; feet, pale brownish fleshy; bill, dark horny brown, pale fleshy beneath at base."

The wing of *O. horsfieldi* is given as 138 mm. (Sundevall, Journ. für Orn., 1857, 161), and from 133.5 to 137 mm. (Seebohm, Catal. Birds Brit. Mus., V. 153).

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*Catal. Birds Brit. Mus., V, 153.

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OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SUBSPECIES OF *STENOPSIS CAYENNENSIS* FROM CURAÇAO.*

BY CHARLES W. RICHMOND.

The Goatsucker described below was presented to the U. S. National Museum by Capt. Wirt Robinson, U. S. A., who obtained it on the Island of Curaçao, in June, 1900.

Birds of the genus *Stenopsis* have been previously reported from Curaçao by Messrs. Peters† and Hartert,‡ but in each case the collector obtained only females, which Hartert was unable to separate from *S. cayennensis.* Capt. Robinson's specimen is a male, in fresh plumage, and may be described as follows:

Stenopsis cayennensis insularis new subspecies.

Type.—Adult male, No. 175,245, U. S. National Museum, Curaçao, June 30, 1900, Capt. Wirt Robinson, U. S. A. (collector's No. 1446). Upper parts, pale drab gray, somewhat lighter on head, all of the feathers finely vermiculated with buff, brown, or black; feathers of median part of head with broad black centers, edged with pale cinnamon; scapulars, black, the inner webs mottled with rufous, the outer webs with buff; feathers of rump and upper tail-coverts with black shaft streaks, the latter with indications of black cross-bars; nape, pale cinnamon; wing-coverts and tertiaries similar in color to the back, the former spotted with buff and pale cinnamon; primary coverts, clove brown, with Mars brown markings on outer webs. Chin, throat, abdomen, and narrow line on forehead, white; lores, a narrow line over and under eye, ear-coverts, and sides of neck, pale cinnamon, with black and white markings; a patch of feathers on sides of throat, cinnamon, tipped with black; breast and sides of body, pale cinnamon, mixed with white and more or less barred and mottled with black; under wing-coverts, Mars brown, mottled with black, the innermost feathers, and axillaries, white. Under tail-coverts, deep brownish buff; middle tail feathers, drab gray, with fine dusky vermiculations and crossed by about nine irregular blackish bars; next three pairs of feathers mainly blackish on outer webs and tips (basal third mottled with pale cinnamon and black), inner webs white, with an oblique black bar near the middle of the feather; outer pair of feathers white, with an oblique black bar on the inner webs, and a small mottled patch at tip. Outer primaries, clove brown, with a grayish shade on outer webs and tips; a broad white bar across the four outer feathers; inner primaries, clove brown, with Mars brown markings on the outer webs; secondaries, blackish, with white tips, tinged with pale cinnamon on the innermost; outer webs mottled with Mars brown. Wing feathers at base, white, mottled with pale cinnamon. Wing, 130 mm.; tail, 113 mm.; tarsus, 18 mm.; culmen, 12 mm.

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†Journ. für Orn., 1892, 87.

‡Ibis, 1893, 319.

This subspecies is closely related to *S. cayennensis*, but is smaller and paler, of clearer color, with darker under tail-coverts.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SIX NEW SKUNKS OF THE GENUS *CONEPATUS.*

BY C. HART MERRIAM.

The seemingly inexhaustible collections of Mexican mammals made by E. W. Nelson and E. A. Goldman for the Biological Survey of the U. S. Department of Agriculture contain large series of skunks of all three genera—*Mephitis*, *Spilogale* and *Conepatus*. Among the latter are several that appear to be new. One of these (*Conepatus tropicalis*) has two dorsal stripes and is closely related to *C. mapurito* from Bogota. It belongs, apparently, to Gray's *Marputius*, which seems to be a valid subgenus. The others are characterized by a single broad dorsal band and by cranial peculiarities that seem to be of sufficient weight to demand independent subgeneric recognition. The group may be characterized as follows:

Subgenus **Oryctogale** nob.

Type.—Conepatus leuconotus (Licht.) from Vera Cruz, Mexico.

Characters.—Snout very long, overhanging the incisors a full inch (25 mm.), with a large naked pad on upper side for rooting in the ground; soles of hind feet entirely naked to heel. Color black, with a single white median dorsal band, beginning on top of head between ears (or midway between eyes and ears) and reaching posteriorly to tail; tail white except at base underneath, which is black.* Skull relatively high; anterior nares large and obliquely truncate (broadly open as seen from above); ascending arm of premaxillæ reduced to a slender oblique splint; nasals and maxillæ ending posteriorly on essentially same plane; anterior part of nasals (in profile) essentially in fronto-nasal plane (not upturned or pugged); postorbital constriction slight; antorbital foramen single throughout.

The new forms are:

Conepatus leuconotus texensis subsp. nov.

Type locality.—Brownsville, Lower Rio Grande, Texas. Type No. $\frac{34857}{47122}$ ♂ ad., U. S. National Museum, Biological Survey Collection. July 20, 1892. F. B. Armstrong. Original No. 70.

Range.—Coast strip of Texas from Rockport, Aransas County, to mouth of Rio Grande; may extend southward into Tamaulipas.

Characters.—Similar to *leuconotus* but somewhat larger, with white dorsal area more restricted, usually contracting on rump to a narrow stripe and in some specimens disappearing altogether, leaving the rump largely or wholly black. Usually a narrow white line connects the white dorsal area with the white of the tail. Black of underside of tail more extensive than in *leuconotus*, usually spreading over sides of base, and reaching out on underside at least one-third and often one-half the distance from base to tip [in *leuconotus* ending opposite toes of outstretched hind feet].

Measurements.—Average of 4 males from type locality: total length 825; tail vertebræ 365; hind foot 86. Average of 4 females from same place: total length 708; tail vertebræ 292; hind foot 76. Largest skull of ♂: basal length 77; zygomatic breadth 55.5; palatal length 35; upper molar on outer edge 10. Largest skull of ♀: basal length 66; zygomatic breadth 48; palatal length 31; upper molar on outer edge 9.5.

Conepatus sonoriensis sp. nov.

Type locality.—Camoa, Rio Mayo, Sonora, Mexico. Type No. 95,914, ♀ yg. ad., U. S. National Museum, Biological Survey Collection. October 29, 1898. E. A. Goldman. Original No. 13,213.

Range.—Northwestern Mexico from Valparaiso Mountains, Zacatecas, northwesterly over Sinaloa (specimens from Santa Cruz de Alaya) and into Sonora for an unknown distance (specimens from Camoa, Rio Mayo).

Characters.—Size large (hind foot in ♂ about 85; in ♀ about 80);

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*Sometimes a few black hairs are inconspicuously mixed in the white of the tail. In some specimens of *C. leuconotus texensis* the white dorsal band fails on the rump; with this exception the color-pattern as above described is constant throughout the group.

white dorsal band broad throughout; tail long, the black at base beneath very short, falling short of outstretched feet; skull long and relatively slender; frontals even more elevated than in *leuconotus;* upper molar and sectorial large.

Remarks.—In cranial characters the relationship of this species to *C. leuconotus*, of eastern Mexico, is surprisingly close, particularly in view of the fact that their ranges are on opposite sides of the continent, separated by a broad interval inhabited by a very different species. Unfortunately no skull of the male from the type region is available for comparison. Skulls of females resemble those of female *leuconotus* and *texensis* but are narrower throughout, with narrower anterior nares and shallower postorbital constriction.

Measurements.— ♂ yg. ad., from Valparaiso Mountains, Zacatecas: total length 715; tail vertebræ 300; hind foot 84. Average of 3 young adult ♀ topotypes: total length 647; tail vertebræ 276; hind foot 79. Skull of type specimen (♀ yg. ad.): basal length 66.5; zygomatic breadth 43; palatal length 33; upper molar on outer edge 8.5.

Conepatus mesoleucus mearnsi subsp. nov.

Type locality.—Mason, Mason County, Texas. No. $\frac{2154}{2681}$, ♀ ad. Merriam Collection. February 20, 1886. Ira B. Henry.

Range.—Tableland of Mexico and adjacent southern part of the United States, from Jalisco (Guadalajara and Zapotlan) and southwestern San Luis Potosi northward to central Texas (Llano and Mason) and central Arizona (Phoenix and Fort Verde). Specimens from Colima appear to be nearer *mesoleucus* than *mearnsi.*

Characters.—Similar to *mesoleucus* but skull and molar teeth decidedly smaller.

Measurements.— ♂ yg. ad., from Boquillas, Texas: total length 670; tail vertebræ 290; hind foot 75. Adult ♀ from same place: total length 580; tail vertebræ 220; hind foot 70. Average of 3 females from Hacienda La Parada, San Luis Potosi: total length 628; tail vertebræ 243; hind foot 72.

Conepatus filipensis sp. nov.

Type locality.—Cerro San Felipe, Oaxaca (altitude 10,000 feet). No. 68,172, ♂ ad., U. S. National Museum, Biological Survey Collection. August 24, 1894. E. W. Nelson and E. A. Goldman. Original No. 6,619.

Range.—Forests of pine and oak on summit of Cerro San Felipe from altitude of 9000 up to 10,500 feet.

Characters.—Size small (hind foot in ♂ only 74); pelage soft, full and woolly; dorsal white stripe rather narrow, especially on shoulders; skull small, depressed and flattened anteriorly, the profile sloping rather evenly from middle of parietals to front of nasals; anterior nares small; postorbital constriction strongly marked; zygomata broadest posteriorly; upper molar and sectorial smaller than in any known species except *pediculus.*

Remarks.—Conepatus filipensis appears to be a high mountain species. Externally it differs from its relative of the surrounding low country, *C. mesoleucus*, in much smaller size, softer, fuller pelage, and the restriction of the white dorsal area. The skull and molariform teeth are so much smaller as not to require comparison.

Measurements.—Type specimen (♂ ad.): total length 630; tail vertebræ 265; hind foot 74. Skull of type specimen: basal length 64; zygomatic breadth 47.5; palatal length 31; length of upper molar on outer edge 7.5.

Conepatus pediculus sp. nov,

Type locality.—Sierra Guadalupe, Coahuila, Mexico. No. 116,953, ♂ yg. ad., U. S. National Museum, Biological Survey Collection. April 25, 1902. E, W. Nelson and E. A. Goldman. Original No. 15,123.

Characters.—Size smallest of the known species (hind foot only 61); skull and teeth smallest (in male smaller than in female of *C. mesoleucus mearnsi*); skull short; nasals very broad and flat, ending posteriorly in a straight line; anterior nares smallest; braincase strongly elevated; frontonasal region flat, smooth, sloping strongly downward, in profile a straight line. In the type and only specimen, there is a median circular bulge (probably abnormal) on the posterior half of the frontals.

Remarks. —Owing to its small size this species requires no direct comparison with others. The only one approaching it in the small size of the teeth is *C. felipensis* from Cerro San Felipe, Oaxaca.

Measurements.—Type specimen (♂ yg. ad.): total length 485; tail vertebræ 178; hind foot 61. *Skull:* basal length 57; zygomatic breadth 43; palatal length 27; upper molar on outer side 7.

Subgenus **Marputius** Gray.

Conepatus tropicalis sp. nov.

Type locality.—Motzorongo, Vera Cruz, Mexico. Type No. 63,650, ♂ ad., U. S. National Museum, Biological Survey Collection. February 26, 1894. E. W. Nelson and E. A. Goldman. Original No. 5,903.

Range.—Tropical east coast of Vera Cruz and thence southeasterly to Yucatan. Limits of range unknown.

Characters.—Back with two rather narrow parallel white stripes (about 30 mm. in width, and separated by a still narrower internal stripe) reach-from nape (where they unite in a nuchal patch with convex front) to hips (where they taper off to a point); tail very short, white except on basal part which is black all round, the black covering about one-third of the vertebræ above and one-half below, and presenting a V-shaped indentation on median line above.

Cranial characters.—In addition to the cranial characters mentioned in the above diagnosis of the subgenus *Marputius*, it may be remarked that the skull has a "humpy" appearance, due chiefly to the bulging frontals and depth of the postorbital constriction. The profile is sinuous, presenting three prominences and two depressions. The prominences are formed by the slightly upturned tips of the nasals, the interorbital bulge of the frontals, and a posterior prominence on the frontals behind the constriction.

Remarks.—So far as I am aware this is the only striped-backed *Conepatus* inhabiting Mexico. All the other species of the genus have a single broad white band down the back and belong to the subgenus *Oryctogale.*

Conepatus tropicalis differs strikingly in external characters and moderately in cranial characters from both *Conepatus* proper (*C. humboldti* from Patagonia) and the white-backed Mexican species here subgenerically distinguished under the name *Oryctogale.* In most respects it is intermediate between the two. Externally it has the large nose pad and naked soles of *Oryctogale,* but the dorsal stripes and tail differ from either. In cranial characters it favors *Conepatus.* The fronto-nasal region is depressed less than in *C. humboldti* but much more than in *Oryctogale;* the anterior nares are intermediate in obliquity of truncation; the antorbital foramen opens anteriorly by two or more pores as in *C. humboldti,* and the postorbital constriction is as deep as in that species.

Measurements.—Type specimen: total length 575; tail vertebræ 129; hind foot 74. *Skull:* basal length 67.5; zygomatic breadth 50.5; palatal length 32.5; length of last upper molar on outer side 8.

VOL. XV, PP. 167-172 AUGUST 6, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW ARCTIC FOXES.

BY C. HART MERRIAM.

The White or Arctic fox of Lapland* and Siberia was described by Linnæus in 1758 under the name *Canis lagopus* (Syst. Nat., Ed. 10, p. 40, 1758). A related form from Iceland (the Sooty fox of Pennant), was named *Canis fuliginosus* by Shaw in the year 1800 (Gen. Zool., Vol. I, pt. II, p. 331, 1800). So far as I am aware no other names for members of the group were proposed until 1898, when Barrett-Hamilton and Bonhote in a joint paper described a small form from Spitzbergen as subspecies *spitzbergenensis* (Ann. & Mag. Nat. Hist., 7th ser., I, p. 287, April, 1898). But they state that they are unable to distinguish the Spitzbergen form from the one from Iceland—named *fuliginosus* by Shaw a century earlier. If the two are the same, *spitzbergenensis* of course becomes a synonym of *fuliginosus*.

In 1900 I described a small Arctic fox from Hall Island, Bering Sea, under the name *hallensis* (Proc. Wash. Acad. Sci., II, p. 15, March 14, 1900).

The material at present available for study is utterly insufficient to admit of a satisfactory revision of the group. Barrett-Hamilton and Bonhote had few if any skins with skulls from the old world, and none at all from America. Our National Museum is decidely better off, especially with reference to material from Alaska and Labrador, but we still lack reliable flesh measurements, and also lack series of skins and skulls put up according to modern standards.

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*The type locality may be restricted to Lapland.

An examination of the specimens in the collections of the Biological Survey and the National Museum shows that several unrecognized forms exist. The animal inhabiting the mainland of Alaska and Canada from the mouth of the Yukon and Point Barrow easterly to Hudson Bay and Cumberland Island differs both from true *lagopus* of Scandinavia and from the animals inhabiting islands in Bering Sea.*

The most perplexing Arctic foxes I have seen are from Pribilof Islands in Bering Sea.† The skulls from St. Paul Island are of three sizes; a very large and long skull with long and rather slender rostrum, like a red fox; a very small skull with small teeth (smaller even than our specimens of *hallensis*); and one which is intermediate in size and characters between the others and which agrees essentially with the common Arctic fox of the Alaska mainland. The collections contain a number of skulls of each of these three forms, though the number of the smallest size is much less than of the others. What do these facts signify? Three theories occur to me: (1) that the large skulls represent a large resident species while the two others are stragglers from St. Matthew [or some other] Island and the mainland respectively, reaching the Pribilofs by means of the pack ice; (2) that the large skulls represent a large resident species; the small ones stragglers from St. Matthew [or some other] Island, while the middle sized ones are hybrids between these two; (3) that all three belong to a single species which presents extraordinary and unprecedented variations in size.

Personally, I believe that the large animal is a well marked

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*A specimen in the National Museum from Cumberland Island is essentially identical with specimens from Alaska except that the lower premolars are somewhat larger, in this respect resembling the Labrador form, which is here described as subspecies *ungava*.

†The National Museum has a series of skulls and several skins from St. Paul Island, collected by Dr. F. W. True, Dr. D. W. Prentiss, and Mr. Wm. Palmer; and during my visit to the islands in 1891 I secured several specimens on St. George Island.

insular species; the small one a straggler from Hall or St. Matthew [or some other] Island, the others hybrids between these two, or in some cases perhaps, stragglers from the mainland. On this assumption I have named the large form *pribilofensis.* In winter the pack ice from the north often reaches St. Matthew Island and sometimes pushes south to the Pribilofs. The distance between St. Matthew and St. Paul is about 225 statute miles; that between Nunivak (from which we have no specimens) and St. Paul is even less. But wherever the animals come from, the fact is well-known that when the pack ice reaches the Pribilofs, white foxes come ashore on the Islands. They have been seen to do this repeatedly. When observed, they are pursued and killed, if possible, in order to prevent interbreeding with the native blue foxes.

On Bering Island, on the Siberian side of Bering Sea, there appear also to be two forms: the mainland species (*lagopus*) and a large insular species here named *beringensis.*

Pelages.—The characteristic markings of the Arctic foxes are: *In winter pelage,* white throughout, the only marking being the small black pad on end of nose; *in summer pelage,* head, back, a cross-bar over shoulders, outer side of fore and hind legs, upper surfaces of fore and hind feet, and stripe on upperside of tail, brownish dusky, usually darkest on top of head and rump; face strongly, feet moderately mixed with white hairs; ears strongly edged with white; chin grayish dusky; underparts soiled whitish or buffy, becoming strongly buffy on flanks.

The Blue fox of the Pribilofs is a sooty-blue all over at all seasons.

Sexual differences.—As usual among foxes the males are somewhat larger than the females. Among the Arctic foxes the difference in size of skull is usually not great, but the large upper molar, and the carnassial above and below are noticeably larger in the males.

The Arctic foxes here recognized in North America (including Bering Island but excluding Greenland) are as follows:

Vulpes lagopus (Linn.). Type locality Lapland. Believed to occur on Bering Island.

Vulpes lagopus innuitus nob. Type locality Point Barrow, Alaska. Ranges from Alaska to Baffin Bay.

Vulpes lagopus ungava nob. Type locality Ungava, Labrador.

Vulpes hallensis (Merriam). Type locality Hall Island, Bering Sea. Occurs on St. Matthew Island also.

Vulpes pribilofensis nob. Type locality St. George Island, Pribilof Islands, Bering Sea. Occurs on St. Paul Island, also.

Vulpes beringensis nob. Type locality Bering Island, Bering Sea.

Vulpes lagopus innuitus subsp. nov.

Type from Point Barrow (Karogar River), Arctic Alaska. No. 107,626, ♀ ad., U. S. National Museum, Biological Survey Collection. June 27, 1898. E. A. McIlhenny. Original No. 831.

Characters.—Similar to *lagopus* in size and general characters, but braincase broader and more pyriform, and tapering much more abruptly behind broadest part; nasals much broader. Contrasted with *pribilofensis* it is so much smaller and shorter as not to require close comparison. Contrasted with *hallensis* it may be distinguished by the following characters: nasals broader; median frontal sulcus deeper; rostral constriction less pronounced; lower premolars larger (most noticeable in third and fourth); first upper molar larger. Contrasted with *ungava* the frontal shield is flatter and the postorbital processes are heavier and more deeply excavated posteriorly.

Cranial measurements.—Skull of type specimen ♀ ad.: basal length 117; zygomatic breadth 69; palatal length 60; postpalatal length 56; breadth of rostrum at second premolar 23.5; upper carnassial (on cingulum) 12.5; first upper molar (tranverse diameter from notch on outer side) 10.

Vulpes lagopus ungava subsp. nov.

Type from Fort Chimo, Ungava, Labrador. No, 23,195, [♂ ad.] U. S. National Museum. Collected by L. M. Turner. Original No. 2,362.

Characters-—Similar to *innuitus* but slightly larger; rostrum slightly longer; frontal shield less flat, swollen anteriorly on each side of median sulcus; postorbital processes more pointed, less massive, and less deeply excavated posteriorly; under jaw much broader vertically and deeply bellied under sectorial.

Compared with *Vulpes lagopus* from Lapland and Sweden, *ungava* differs as follows: postorbital processes more decurved and pointed and less excavated posteriorly; braincase broader and more pyriform (broadly inflated on plane of posterior edge of posterior root of zygoma, behind which it tapers much more abruptly); frontal shield less flattened; nasal broader; crown of fourth lower premolar larger and longer; base of skull decidedly shorter, as shown in shorter basioccipital and basisphenoid and in the distance from foramen magnum to plane of upper sectorial; similarly, the lower sectorial is nearer the condyle. Under jaw much broader vertically and more bellied under sectorial.

Measurements.—Skull of type specimen: basal length 118; zygomatic breadth 70; palatal length 63; postpalatal length 55; breadth of rostrum at second premolar 26; upper carnassial (on cingulum) 12.5; first upper molar (transverse diameter from notch on outer side) 9.5.

Vulpes pribilofensis sp. nov.

Type from St. George Island, Pribilof Islands, Bering Sea. No. 42,624, ♂ ad., U. S. National Museum, Biological Survey Collection. August, 1891. C. Hart Merriam.

Characters.—Largest of the *lagopus* group. Skull much elongated, resembling that of a Red fox more than that of the Arctic foxes; rostrum long and set far forward, the postpalatal length exceeding that of any other known form. In the type specimen the frontals are narrow anteriorly and the postorbital processes are only slightly developed. In skulls from St. Paul Island the frontal shield is broader and the postorbital processes are much more prominent. Contrasted with skulls of *Vulpes* from the mainland (St. Michaels and Lower Yukon region) the differences are very marked. *V. pribilofensis* is larger throughout but the difference is most marked in the total length and zygomatic breadth, and in the greater production of the rostrum. The rostrum is not only longer but is set much farther forward so that the postpalatal length is very much greater. In most specimens the palatal and postpalatal lengths are subequal, but in one or two skulls of old males from St. Paul Island the palatal length considerably exceeds the postpalatal. [In *V. innuitus* the postpalatal length is always very much less than the palatal.] The braincase is longer and flatter; the sagittal crest more strongly developed posteriorly; the frontal hump (at base of nasals) more marked. The teeth are essentially the same as in *innuitus.* The species requires no comparison with the small *V. hallensis* from Hall and St. Matthew islands.

Cranial measurements.—Skull of type specimen (♂ ad.): basal length 127; zygomatic breadth 72; palatal length 66; postpalatal length 61; breadth of rostrum at second premolar 25; upper carnassial (on cingulum) 12.5; first upper molar (transversed diameter from notch on outer side) 9.5. An old ♂ from St. Paul Island: basal length 130; zygomatic breadth 78; palatal length 67; postpalatal length 62; breadth of rostrum at second premolar 26.

Vulpes beringensis sp. nov.

Type from Bering Island, Bering Sea. No. 47,109, [♀ yg. ad.], U. S. National Museum, Biological Survey Collection. June 3, 1892. B. W. Evermann.

Characters.—Size large, nearly equalling *pribilofensis*; rostrum broad and massive; frontals high anteriorly and swollen on each side of median sulcus; premolars large and swollen. Compared with *lagopus* the skull is decidely larger; the rostrum and nasals broader; frontals more elevated anteriorly; molars and premolars larger. Compared with *pribilofensis*, with which it nearly agrees in size, the rostrum is shorter and broader; rostral constriction or 'step' much more pronounced; frontals anteriorly more elevated; base of cranium shorter; molars and premolars decidedly larger and more swollen.

Cranial measurements.—Skull of type specimen [♀ yg. ad.]: basal length 123; zygomatic breadth 71; palatal length 66; postpalatal length 56; breadth of rostrum opposite second premolar 27. An old ♀ from type locality: basal length 128; zygomatic breadth 77; palatal length 68; postpalatal length 60; breadth of rostrum at second premolar 26. Upper carnassial (on cingulum) in young ♂ 13.5; first upper molar (transverse diameter from notch on outer side) 11.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW MALAYAN MOUSE DEER.*

BY GERRIT S. MILLER, JR.

The series of Mouse Deer in the United States National Museum contains two hitherto undescribed forms, one from the Malay Peninsula, the other from Borneo. They may be named and defined as follows:

Tragulus ravus sp. nov.

Type.—Immature† female (skin and skull) No. 83,506 United States National Museum. Collected in Trong, Lower Siam, September 6, 1896, by Dr. W. L. Abbott.

Characters.—A member of the *kanchil*‡ group resembling *Tragulus pallidus* from Pulo Laut, North Natuna Islands, but larger, the general color less pallid, legs more red, and dark nape stripe less well defined.

Color.—Back and sides ochraceous buff heavily clouded by the blackish hair tips, so that the general effect is a yellowish gray, darker on back and shoulders, where black is distinctly in excess, noticeably lighter on sides. Legs, except for the usual white markings, ochraceous, slightly paler than that of Ridgway. A narrow, very indistinct line of this color divides color of sides from the pure white of underparts. In axillary region this line widens to cover sides of chest and send back an irregular and variable streak along middle of belly. Neck ochraceous, less bright than that of legs and much sprinkled with black. Nape-band ill-defined, black, considerably mixed with ochraceous. Throat markings normal, the dark bands like sides of neck and well defined collar slightly paler. Head and face like sides of neck, but ochraceous less bright and black hairs more numerous. Tail white beneath and at tip, dull ochraceous above.

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†Uterus contained a full grown fetus. Milk premolars still in place, though very much worn.

‡For use of this name see Stone and Rehn, Proc. Acad. Nat. Sci. Philadelphia, 1902, pp. 128–131. June 4, 1902.

Skull.—The skull shows no characters worthy of note, except that in size it distinctly exceeds that of *Tragulus pallidus.*

Measurements.—External measurements of the type: total length, 535; head and body, 470; tail vertebræ, 65; hind foot, 120; hind foot without hoofs, 108. Weight, 1.9 kg. An adult male from the type locality: total length, 520; head and body, 445; tail vertebræ, 75; hind foot, 112; hind foot without hoofs, 102. Skull of type: greatest length, 94; basal length, 86; basilar length, 82; occipito-nasal length, 89. Skull of adult male: greatest length, 93; basal length, 85; basilar length, 80; occipito-nasal length, 86.

Specimens examined.—Eight, all from the type locality.

Remarks.—This species is readily distinguishable from *Tragulus kanchil* by its pallid coloration, and from *T. pallidus* by its greater size.

Tragulus borneanus sp. nov.

Type.—Adult male (skull only) No. 34,924 United States National Museum. Collected on the Suanlamba River, British North Borneo, by C. F. Adams.

Characters.—In general similar to *Tragulus napu* from Sumatra, but smaller and darker; toothrow longer than in the Sumatran animal.

Color.—Through preparation by means of an acid preservative fluid the skins examined have been altered in color by the removal of most of the red and yellow tints. The color pattern, however, remains unchanged. Underparts as in *Tragulus napu*, the middle of belly with a dusky wash (probably rusty before action of acid) on tips of hairs. Upperparts with decidedly more black than in *T. napu*, the crown and nape stripe nearly clear black, and the black clouding of the back much more noticeable, in this respect suggesting *T. pretiosus.*

Skull and teeth.—The skull is distinctly smaller than that of *Tragulus napu*, so much so that those of immature individuals suggest those of *T. kanchil.* In general form there appear to be no tangible differences. The ascending portion of the premaxillary is broader than in the Sumatran animal, and the horizontal portion less produced forward. Teeth actually as well as relatively larger than in *T. napu*, the difference particularly noticeable in the lower premolars.

Measurements.—External measurements* of adult female from Sapagaya River, British North Borneo (No. 19,213 U. S. Nat. Mus.): total length, 600; head and body, 520; tail vertebræ, 80; hind foot, 132 (118).

Cranial measurements of type: greatest length, 107 (115)†; basal length, 102 (108); basilar length, 96.5 (100); occipito-nasal length, 101 (104); zygomatic breadth, 49 (49); least interorbital breadth, 29 (32); mandible 84 (90); maxillary toothrow, 42 (37.4); mandibular toothrow, 48 (42.4).

Specimens examined.—Seven skins and skulls, all from British North Borneo.

Remarks.—That the Bornean Napu is distinct from that of Sumatra might readily have been suspected in view of the known tendency of the group to vary. Actual comparison shows that the animals are readily separable.

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*From well made skin.

†Measurements in parenthesis are those of an adult male *Tragulus napu* from Tapanuli Bay, northwestern Sumatra.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW PLANTS FROM NEW MEXICO.*

BY CHARLES LOUIS POLLARD AND T. D. A. COCKERELL.

The mountain ranges of New Mexico, numerous and largely isolated as they are, offer unusually favorable conditions for the development of local types of plants and animals. Only a few of these ranges have been explored for plants with any degree of thoroughness, and even these are still yielding novelties whenever visited. The Sandia Mountains, within sight of Albuquerque, were visited long ago by Bigelow, but have since then been strangely neglected. Miss C. Ellis recently obtained a small series of plants in these mountains, and we find among them such conspicuous novelties as the *Primula* and *Achillea* herewith described. The Las Vegas Range, being really continuous to the north with the mountains of Colorado, would not be expected to have a peculiar flora; but as a matter of fact many of the plants are quite different from their congeners in Colorado. This statement is made with some degree of confidence, because the difference is seen in many conspicuous members of the flora, and is not easily overlooked; moreover, the junior writer of this paper spent three years at the foot of the Sangre de Cristo mountains in Colorado, and became familiar with the plants of that region.

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A *Primula* and a violet are here described from the Las Vegas Range, the former from the Hudsonian zone, the latter from the Canadian zone.

Viola Wilmattae.

Acaulescent, low (5-7 cm. high at flowering), tufted, the scape barely exceeding the foliage; leaves practically glabrous, cordate in general outline, all palmately cleft and lobed with numerous divisions; stipules lanceolate, scarious; scapes bibracteate at about the middle; flowers deep violet, 2 cm. broad; sepals lanceolate, slightly scarious-margined; petals narrowly oblong, well bearded; fruit not observed.

Type No. 404,924, in the United States National Herbarium, collected in Sapello Canon, Beulah, New Mexico (altitude about 8000 feet), by Mrs. Wilmatte P. Cockerell, for whom it is named.

The species is of interest as being the only representative of the palmatae occurring in the Southwest. It is related to *V. cognata* Greene much as *V. palmata* is related to *V. papilionacea* of the Eastern States. From the compestrine *V. pedatifida* and *V. Bernardi* it may be distinguished by the color of the flowers, the much smaller, narrowly oblong leaves, and the remarkably uniform cut of the latter. In this connection it is worthy of note that Mrs. Cockerell has collected *V. pedatifida* further up the same canon.

Primula Ellisiae.

Plant about 1 dm. high, from a stout vertical caudex; leaves minutely scabrous on both surfaces, oblong-spatulate in outline, tapering to scarious-margined petioles, the upper half of the blade irregularly and sharply serrulate with salient teeth, the apex obtuse or acutish; scape barely surpassing the leaves, bearing a dense umbel of rather large flowers; calyx-teeth lanceolate, exceeding the tube, the whole calyx densely farinose, but tending to become glabrate with age; corolla tube twice the length of the calyx; limb of the corolla $\frac{2}{3}$ cm. in diameter, lavender-purple with a yellow eye, the lobes truncate and retuse.

Type No. 404,914 in the United States National Herbarium, collected by Miss C. Ellis in the Sandia Mountains of New Mexico.

This beautiful species is allied to *P. Rusbyi* Greene, the type of which was collected by Dr. Rusby in the Mogollon Mountains of New Mexico in 1881. It differs in having much larger flowers and a conspicuously farinose calyx; the leaves are also shorter-petioled, more spatulate in outline, and more distinctly serrulate on the margins. In the size of its flowers it even approaches *P. Parryi* Gray, of the Rocky Mountain region, while the white, farinose calyx resembles that of *P. farinosa*.

Primula angustifolia Helenae.

Leaves narrowly linear and remotely denticulate; corolla lobes longer and narrower than in the type; flowers white with a yellow eye.

Type No. 404,913 in the United States National Herbarium, collected on the summit of the Las Vegas Mountains of New Mexico (altitude about 11,000 feet), June 29, 1901, by Miss Helen Blake, for whom it is named. The typical *P. angustifolia* is common in the same region.

Achillea laxiflora.

Perennial, glabrous; leaves coarsely pinnatifid, the upper ones 5-6 cm. long; divisions irregularly lobed or cleft, the ultimate segments acute; inflorescence loosely corymbose, the peduncles long and inclined to droop; heads turbinate, about 8 mm. high; bracts closely imbricated, scarious, with a greenish keel; rays orbicular, usually large (5 mm. broad in the dried specimen), pure white; achene linear, the apex prominently scarious-margined, the sides scarcely so.

Type No. 404,884 in the United States National Herbarium, collected by Miss C. Ellis in the Sandia Mountains of New Mexico, at an altitude of 8000 feet. The plant attracts attention by its loose and comparatively few-flowered corymb and by the large heads with conspicuous orbicular rays. The segmentation of the foliage is also of an entirely different type from that observable in other western yarrows; and the apically margined achenes afford a conspicuous character.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF NEW SPECIES OF *SYNAPTOMYS* AND *PHENACOMYS* FROM MACKENZIE, CANADA.

BY EDWARD A. PREBLE.

In studying a collection of mammals from the region of Athabasca and Great Slave lakes, I find the following forms of *Synaptomys* and *Phenacomys* which appear to be undescribed. Neither of these genera has been previously recorded from this region.

Synaptomys (Mictomys) bullatus sp. nov.

Type from Trout Rock, near Fort Rae, Great Slave Lake, Mackenzie, Canada. Skin and skull No. 110,632, ♂ ad., U. S. National Museum, Biological Survey Collection. Collected August 17, 1901, by Edward A. Preble. Original No., 4511.

General characters.—Similar to *Synaptomys* (*Mictomys*) *innuitus*, but differing in cranial characters; closely resembling *S. dalli* cranially, but differing in color; hind foot small.

Color.—Fur at base dark plumbeous, tipped with black and reddish-brown, the black usually predominating on the back; sides lighter than back; belly ashy-plumbeous, rather abruptly separated from the color of sides; feet dusky brown; tail bicolor, dusky above, ashy beneath.

Skull.—Compared with skulls of *Synaptomys* (*Mictomys*) *innuitus* from Labrador, skulls of *bullatus* differ as follows: skulls less flat, the zygomatic arch descending farther below level of top of skull; bullæ more inflated.

Measurements.—Of type: total length, 130; tail vertebræ, 24; hind foot, 18. The skull of the type measures: occipito-nasal length (tip of nasals to foramen magnum), 26; zygomatic breadth, 16; interorbital constriction, 3; length of upper molar series (crowns), 7.

General remarks.—Cranially *Synaptomys bullata* resembles closely *S. dalli* of Alaska, but in color it shows much less reddish-brown than either *wrangeli* or *dalli*. The hind foot of *bullata* is smaller than that of *wrangeli*, *dalli*, or *innuitus*.

Phenacomys mackenzii sp. nov.

Type from Fort Smith, Slave River (near the Athabasca-Mackenzie boundary line), Canada. Skin and skull No. 110,625, ♂ ad., U. S. National Museum, Biological Survey Collection. Collected June 29, 1901, by Edward A. Preble and Alfred E. Preble. Original No. 4271.

General characters.—Similar to *Phenacomys celatus* and *P. c. crassus*, but differing in cranial characters.

Color.—Fur everywhere plumbeous at base, on back tipped with yellowish-brown, black, and gray in varying proportions; beneath grayish-white, passing gradually on sides into color of back; tail bicolor, narrowly brownish above, grayish-white beneath.

Cranial characters.—Compared with skulls of *P. celatus*, those of *mackenzii* have the bullæ more roundly inflated, palate shorter, rostrum more slender, postorbital process of squamosal more slender, and interorbital constriction narrower. Interorbital beads prominent, even in youth, converging early in life and nearly uniting in old age.

Measurements—The type measures: total length, 142; tail vertebræ, 34; hind foot, 17. Ten adult specimens of both sexes from type locality average: total length, 140.7; tail vertebræ, 32.7; hind foot, 17.

General remarks.—In color the type series resembles quite closely a portion of the type series of *Phenacomys c. crassus*, kindly lent me for comparison by Mr. Outram Bangs. I have not examined specimens of *Phenacomys constablei*, described by Allen from Telegraph Creek, British Columbia,* which seems to belong to this group, but its measurements show that it has a larger hind foot than *P. mackenzii*.

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*Bull. Am. Mus. Nat. Hist., Vol. XII, p. 4, 1899.

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PROCEEDINGS

OF THE

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THE GENUS HEDYSARUM IN THE ROCKY MOUNTAINS.

BY AVEN NELSON.

Most of the material that has been collected in the genus *Hedysarum* in the Rocky Mountain Region has found its way into the herbaria either as *H. boreale* or *H. Mackenzii*. More recently some of it is appearing under other names. Of the numerous collections made by the writer some have been distributed under the foregoing names, but always with the feeling that a careful study of ample material would show that material so distributed usually represented an aggregate. For the sake of light on this point careful study of the literature and the specimens at hand has been made with the following conclusions respecting all the species heretofore attributed to this region.

Hedysarum Americanum (Michx.) Britt.

Hedysarum alpinum Americanum Michx. Fl. 2:74; Pursh, Fl. 2:484. *H. boreale* Nutt. in D. C. Prodr. 2:343, in part; Hook. Fl. Bor. Am. 1:155, in part; and later authors in part. Not *H. boreale* Nutt. Gen. 2:110.

It does not seem to me that there is sufficient evidence to show that the plants of Michaux "In borealibus Canadae et in cataractis montium Alleghanis" and those of Nuttall "In arid and denudated soils around Fort Mandan on the banks of the Missouri" are the same species. In fact the descriptions do not tally very closely and Nuttall merely suggests the possibility. The two habitats are so wholly different as to suggest in themselves the distinctness of the plants.

Hedysarum boreale Nutt.

Hedysarum boreale Nutt. Gen. 2:110; and of many later authors in part. See citations and the note on the preceding.

When the proper locality shall have been visited, Nuttall's subvillous species with its obovate leaflets and round articulation in the loment will probably be found again.

Hedysarum cinerascens Rydb.

Hedysarum cinerascens Rydb. Mem. N. Y. Bot. Gard. 1:257. *H. canescens* Nutt. T. & G. Fl. N. Am. 1:358.

This species is not of frequent occurrence, but is occasionally found in typical form from central Wyoming, northward and westward. The cinereous pubescence throughout, the small stipules and the short corolla-wings are distinctive.

Hedysarum lancifolium Rydb.

Hedysarum lancifolium Rydb. Mem. N. Y. Bot. Gard. 1:256.

No specimen of this is at hand, but judging by the description it is an excellent species. Known only from the original locality, "Head water of Jocko River, Mont., 1883, Canby, 93."

Hedysarum marginatum Greene.

Hedysarum marginatum Greene, Pitt. 138. 1900.

Of this species the description is not just now at hand but judging by a specimen of the type number (Pagosa Springs, Colo., Baker, 1899) it is strongly marked. Presumably that is still the only collection of it.

Hedysarum Mackenzii Rich.

Hedysarum Mackenzii Rich. Frankl. Jour. 745.

It is usual to call the commonest form of *Hedysarum* in the Rocky Mountains by this name in spite of the fact that it does not at all closely accord with the original description. It seems highly probable that no true *H. Mackenzii* occurs within the United States, at least no specimens have come under my observation with leaves that are "canescently hairy on both sides," or "utrinque canescenti-pilosis," and with the joints of the legume "rugose and pilose." The original specimens from "Barren grounds, north of Lat. 64, as far as the shores of the Arctic Sea" must have been very different. The Rocky Mountain plant may be named as follows:

Hedysarum pabulare n. sp.

Stems several from the crown of a woody root, decumbent at base and moderately slender, 4–7 dm. long, subcinereous and obscurely striate: leaves petioled, 5–10 cm. long; leaflets 9–15, from narrowly to broadly oblong or rarely on some of the lower leaves obovate and emarginate, 1–2 cm. long, subcinereous with a minute pubescence below, green, glabrate and minutely puncticulose above; stipules rather small, more or less united, with linear acuminations as long as the body; racemes long, on axillary peduncles surpassing the leaves, its flowers tardily or not at all reflexed; calyx-tube short (about 2 mm.), its teeth linear-acuminate and 3–4 mm. long; corolla lilac or light purple; its standard 12–13 mm. long, broadly obovate, emarginate; the keel obovate-cuneate, equaling the standard and about one-fourth longer than the narrowly oblong wings; joints of the loment, 3–5, suborbicular, 5–7 mm. broad, usually closely united or confluent, more rarely with a narrow canescent connective, the transverse nerves (scarcely reticulate) ending in a thickened margin, light green and appearing glabrous, but sparsely puberulent under a lens.

This species is reputed an excellent forage plant. As previously stated it has often figured as *H. Mackenzii.* The following collections seem to me to be representative of it. Wyoming: 752, Wind River, 1894; 1087, Snake River, 1894; 201, Bates Creek, 1901, by L. N. Goodding. Colorado: Durango, 1898, by C. S. Crandall; 83, Mancos, 1898, by Baker, Earle and Tracy. Utah: 5592, Soldier Summit, 1894, by M. E. Jones.

Hedysarum philoscia n. sp.

Bright green and nearly glabrous throughout; stems slender, 4–7 dm. high, few to several from a freely branched semi-fleshy root; leaves crowded, short petioled, with lanceolate membranous semiconnate stipules: leaflets 15–23, mostly oblong (15–30 mm. long and 7–12 mm. broad), obtuse with a minute mucro, some minute straggling hairs below, especially on the midrib; peduncles axillary, slender, overtopping the leaves; raceme slender, puberulent, acuminate; flowers white, sharply reflexed in bud, rising somewhat in anthesis; bracts filiform; calyx-tube campanulate, with triangular-lanceolate teeth shorter than the tube; corolla narrow, the standard shorter than the narrow keel; the wings linear, with a narrow basal lobe equaling the claw; legume glabrate, mostly three jointed; the joints oval to orbicular, 6–8 mm. long, lightly reticulate from a somewhat larger marginal nerve.

Only two collections of this species are at hand, both of them from rich moist copses on stream banks in the Laramie Mountains of Albany Co., Wyoming. Nos. 2034, Crow Creek, 1896; 3367, Willow Creek, 1897.

Hedysarum sulphurescens Rydb.

Hedysarum sulphurescens Rydb. Bull. Torrey Club 24:253: *H. flavescens* Coult. & Fish. Bot. Gaz. 18:300; not Regel & Schm.

This fine species is of frequent occurence in northwestern Wyoming, and through Montana.

Hedysarum uintahense n. sp.

Green and apparently glabrous throughout, but under a lens sparsely and minutely pubescent: stems stoutish, noticeably striate, mostly erect, the short lower nodes sheathed by the large brown connate stipules; leaves nearly sessile, large, 10–15 cm. long; leaflets 11–23, variable in shape (oval, ovate or even nearly lanceolate), mostly obtuse, 1–3 cm. long; stipules large, semiconnate, brownish, membranous; racemes axillary, in the uppermost approximated nodes appearing clustered, corymbose, or even umbellate, surpassing the leaves; the purple or lavender flowers strongly reflexed from the earliest anthesis; calyx-tube nearly glabrous, campanulate, with oblique margin and short unequal teeth (tube 4 mm. long and teeth usually much less than half as long); corolla large, 15 mm. or more long; the keel surpassing the subequal standard and wings; the wings broadly linear, with a slender claw and a free lobe as long as the claw: loment stipitate, its 2–5 large joints often with a canescent connective; the joints obscurely puberulent, lightly reticulated, narrowly margined, oval to obovate or oblong, 10–15 mm. long.

I cite as type my No. 7198 from the moist draws in the Uinta foot-hills, Evanston, Wyo. This species has been variously treated heretofore but most specimens are probably labelled *H. boreale.* The following I think belong here. Wyoming: My Nos. 877 and 3839; B. C. Buffum's from South Fork, Crazy Woman Creek, 1892; 977, Merrill and Wilcox, Teton Pass, 1901. Washington: 1850, L. H. Henderson, Olympic Mountains. Colorado: 464, Baker, Earle and Tracy, near La Plata. The last two are given with some reserve.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF EIGHT NEW BIRDS FROM ISLANDS OFF THE WEST COAST OF SUMATRA.*

BY CHARLES W. RICHMOND.

A collection of several hundred bird skins made by Dr. W. L. Abbott during the winter of 1901–2 on various islands off the west coast of Sumatra has been lately received at the United States National Museum. This material was gathered chiefly on Simalur Island; but birds from the small islands of Pulo Babi and Pulo Lasia, southeast of Simalur, and from the Banjak Islands are also well represented.

The collection proves to be of unusual interest, and contains several apparently unnamed species, eight of which are described below.

Macropygia simalurensis sp. nov.

Type.—Adult male, No. 179,067, U. S. National Museum, Simalur Island (west coast of Sumatra), December 9, 1901, Dr. W. L. Abbott.

Head (except ear-coverts), underparts (except middle of breast and abdomen), under wing-coverts and axillaries, reddish chestnut; feathers of chest with dusky blackish bases which are more or less visible; middle of breast and abdomen cinnamon; ear-coverts, sides of neck, and nape cinnamon, with dull black bars; feathers of sides of neck with green and amethyst reflections; mantle and scapulars sepia, the feathers of the latter with reddish chestnut tips; wings and wing-coverts of the same color, the feathers (mainly of the coverts) edged with reddish chestnut, the lesser coverts being entirely of this color, and the middle coverts nearly so; back, rump, and upper tail-coverts burnt umber, the feathers with rather paler edges; three central pairs of rectrices Prout's brown, outer feathers cinnamon rufous, each with a dusky black (gray on under surface) oblique patch near the tip, mainly on the inner web.

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Length (in flesh), 324 mm.; wing, 157; tail, 167; tarsus, 18; culmen, 14.

The female differs in being duller below, with more prominent black mottling on the foreneck and chest; the tertiaries, secondaries, wing-coverts, back, rump and upper tail coverts are more heavily edged with reddish chestnut (paler than in the male); sides of neck, nape, and mantle dull blackish, with pale cinnamon and whitish bars (no glossy reflections), and the forehead is heavily streaked with black. "Iris bluish gray; feet dark purple brown; bill dark brown; black at tip."

The nearest relative of this species appears to be *M. ruficeps.*

Palæornis major sp. nov.

Type.—Adult male, No. 179,111, U. S. National Museum, Pulo Babi (west coast of Sumatra), January 14, 1902, Dr. W. L. Abbott.

Identical in color with *P. fasciatus*, but much larger.

Length (in the flesh), 438 mm.; wing, 192; tail, 230; tarsus, 18; culmen, 18.

A male *P. fasciatus* from the Andaman islands measures: length, 387 mm.; wing, 168; tail, 200. A specimen of the same sex from Tenasserim, has a total length of 324 mm.; wing, 150; tail, 140.

Seven specimens of *P. major* from Pulo Babi and Pulo Lasia are very large and agree in dimensions with the type.

Psittinus abbotti sp. nov.

Type.—Adult male, No. 179,106, U. S. National Museum, Simalur Island (west coast of Sumatra), December 11, 1901, Dr. W. L. Abbott.

Mantle, scapulars, tertiaries, and inner middle and greater wing-coverts, parrot green, the feathers with paler edges, those of the tertiaries and wing-coverts with yellowish green edges; back cobalt blue; rump, upper tail-coverts, middle pair of tail feathers, outer wing-coverts, and upper surface of primaries and secondaries, grass green, each feather with a paler green border; innermost lesser wing-coverts maroon purple; edge of wing and primary coverts greenish blue; head, including nape and hind neck, campanula blue, duller on the sides, becoming green (between emerald and apple green) on the forehead, lores, anterior part of crown and round the eyes, the green feathers being tipped with campanula blue; a narrow band of bluish black feathers separates the blue of the head from the green mantle. Underparts, including under tail-coverts, apple green; under wing-coverts and axillaries carmine; under surface of wing and under primary coverts sooty black, a few of the outer primaries with narrow yellowish edges; tail (except middle pair of feathers), pale lemon yellow, with a greenish wash on outer webs and at tips. "Iris pale yellow; cere dull green; feet greenish; upper mandible red, lower pale fleshy brown." Length (in flesh), 216 mm.; wing, 141; tail, 59; tarsus, 16; culmen, 22.

The black band on the hind neck is much broader on another male. The female is duller in color, and has a green head.

Thriponax parvus sp. nov.

Type.—Adult male, No. 179,160, U. S. National Museum, Simalur Island (west coast of Sumatra), December 3, 1901, Dr. W. L. Abbott.

Similar to *T. javensis*, but of very much smaller dimensions. Length, 362 mm.; wing, 169; tail, 124; tarsus, 28; culmen, 39 (bill from gape, 42).

A male of *T. javensis*, from the Malay Peninsula, measures: length (in flesh), 457 mm.; wing, 227; tail, 160; tarsus, 36; culmen, 58.

Twelve specimens, from Simalur Island, all agreeing with the measurements given above.

Hypothymis abbotti sp. nov.

Type.—Adult male, No. 179,426, U. S. National Museum, Pulo Babi (west coast of Sumatra), January 11, 1902, Dr. W. L. Abbott.

Wholly blue, without the black occipital spot and band across foreneck of *H. azurea*. The color is bright light cyanine blue (of Ridgway's 'Nomenclature of Colors'), with a tinge of deep campanula blue on breast, abdomen, and sides. Wings and tail black, with a bluish shade above; under wing-coverts and axillaries, dusky gray, with bluish tips; wing feathers, from below, with dusky gray edges.

Length (in flesh), 181 mm.; wing, 76; tail, 77; tarsus, 19; culmen, 13 (bill from gape, 20).

This species seems to have no near relative; *H. puella* from Celebes being entirely different. It is strictly congeneric with *H. azurea*, and has the ruff of feathers on the fore-neck common to species of this genus.

Known from Pulo Babi and Pulo Lasia, on the west coast of Sumatra.

Hypothymis consobrina sp. nov.

Type.—Adult male, No. 179,433, U. S. National Museum, Simalur Island (west coast of Sumatra), December 24, 1901, Dr. W. L. Abbott.

This species is similar to *H. tytleri*, from the Andaman islands, but has a shorter wing and tail, and a narrower black band across the fore-neck; the abdomen appears to be of a rather deeper blue.

Length (in the flesh), 165 mm.; wing, 68; tail, 68; tarsus, 16; culmen, 12, (bill, from gape, 18).

Malacopteron notatum sp. nov.

Type.—Adult male, No. 179,346, U. S. National Museum, Pulo Bang Karu, Banjak Islands (west coast of Sumatra), January 17, 1902, Dr. W. L. Abbott.

Top of head, including nape, sooty black; lores, a narrow line round the eye, cheeks, entire underparts, under wing-coverts, and axillaries, white, the feathers of cheeks, throat and chest obscurely streaked with dusky; ear-coverts, smoke gray; sides of neck and mantle brownish drab-gray (each feather white at base), shading into wood brown on back, rump and tertiaries; wing-coverts and edges of primaries and secondaries rather grayer in color; upper tail-coverts deep cinnamon-rufous, the feathers white at their bases; tail Prout's brown, the inner webs of the feathers edged with pale rufous; wing feathers dusky, with white edges on lower surface of inner webs.

Length, 178 mm.; wing, 77; tail, 69; tarsus, 23.5; culmen, 17 (bill, from gape, 21.5).

This species is related to *M. affine* (Blyth.), but has a sooty black cap instead of a brownish black one, and there are other minor differences of color. It differs from *M. cantori* (Moore) in having a distinct cap, in lacking a decided malar stripe, etc.

Stachyris banjakensis sp. nov.

Type.—Adult male, No. 179,344, U. S. National Museum, Pulo Tuanku, Banjak Islands (west coast of Sumatra), January 24, 1902, Dr. W. L. Abbott.

Similar to *S. maculata*, from Borneo, but larger, and color of nape and back grayer.

Length, 200 mm.; wing, 87; tail, 71; tarsus, 27; culmen, 22 (bill, from gape, 27). "Iris brownish yellow; feet, leaden; bill, black, leaden beneath; naked skin on sides of neck pale blue."

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON LITTLE-KNOWN NEW MEXICAN MAMMALS AND SPECIES APPARENTLY NOT RECORDED FROM THE TERRITORY.

BY C. M. BARBER.

The present paper is intended to record certain species of mammals not previously known to occur within New Mexico and to give such notes on their habits as may be of interest. The notes are taken from a field diary made between the years 1897 and 1902. Six species and two genera new to the territory are given. *Ovis mexicanus* has not been previously recorded from the United States. The known range of several species has been greatly extended.

Ovis mexicanus Merriam.

The skins and skulls of a young ram, and old ewe, and a very young lamb, recently came into the author's possession. They were killed in March, 1901, on the Gaudalupe Mountains, near the boundary line between New Mexico and Texas, by Mr. W. E. Schreffler. He informs me that a small band live on this range of mountains, and that they pass up and down the range from New Mexico to Texas. Comparison of these specimens with several specimens of the Mexican big-horn from near the type locality leaves no doubt that the Mexican sheep is found in certain favorable localities in Texas and Southern New Mexico.

Castor canadensis frondator Mearns.

In September of 1898, I located a large colony of beavers about six miles below Ruidoso Post Office, on the Ruidoso Creek, Lincoln County, New Mexico. After a period of probation spent in learning their habits and how to trap them, I succeeded in securing a series of eleven specimens, representing all ages. This species lives here in the creek bank, and little attempt was made to deepen the stream by damming it. I found old cuttings up the stream to an altitude of about 8,000 feet. At the time I visited the colony they were living among the Mexican ranches at about 6,000 feet elevation. At that season (September to November) they were feeding on corn alone, although a few scarred willows were to be seen along the bank. The Mexicans had planted their corn right down to the water's edge to utilize all the available ground in the narrow valley. The beavers were cutting and dragging the corn to the stream, then floating it to their dens. In places there was a wagon load of stalks in the water. Near the dens they had cleaned the ground for a hundred feet on either side and made great trails in dragging stalks to the stream. The Mexicans could not trap them, and as they never appeared in the day time and seldom in the twilight, very few were killed.

Felis hernandesii (Gray).

Mr. Nat. Straw, hunter and trapper, informed me that he trapped a jaguar near Grafton, on Taylor Creek, Socorro County, New Mexico, in May, 1900. He gave its length as 8 feet and 3 inches (2439 mm.) I saw the skin made up into a rug. I have heard of several others being seen or killed. It is probable that they find their way into the Mogollon Mountains by ascending the Gila River.

Conepatus sp. inc.

On August 12, 1901, I trapped an immature individual of this genus in the Domingo Baca canyon on the west side of the Sandia Mountains, 18 miles east of Albuquerque, New Mexico. The trap was baited with carrion and set at the base of a large pine (*Pinus ponderosa*). The altitude was about 7,000 feet. I trapped for several weeks in the same locality but could secure no further specimens. The one secured is not over half grown and does not show specific characters. I can find no record of specimens from New Mexico nor from any point as far north. The species does not appear to be abundant. It seems very strange to find this young individual several hundred miles north of the known range of the genus, and at a high altitude at that. The specimen is now in the Museum of Comparative Zoology, Cambridge, Massachusetts.

Spermophilus interpres (Merriam).

On January 5th, 1898, I secured three specimens apparently referable to this species at the base of the Organ Mountains, near the San Augustine Pass. That they were mating was evident by their actions and the enlarged sexual organs in both sexes. They were on the east side of the range, among the rocks in a sunny canyon in the foothills. They do not hibernate at all or perhaps only during occasional storms. Efforts to trace their range further north in the San Andreas range were unsuccessful, nor have I found the species in any of the other ranges in southern New Mexico. There is a small gap between the Organ Mountains and the Mt. Franklin group (the type locality). These specimens extend the known range about fifty miles northward. The following measurements were taken in the flesh:

Male.—Length, 223; tail, 65; hind foot, 38 mm.
Male.—Length, 240; tail, 86; hind foot, 37 mm.
Female.—Length, 205; tail, 72; hind foot, 36 mm.

Putorius frenatus neomexicanus Barber and Cockerell.

A Mexican brought me a nearly typical specimen of this weasle at Albuquerque, New Mexico, on December 6, 1900. It was a fine male and measured as follows: Total length, 444; tail vertebræ, 176; hind foot, 46 mm. This extends the known range of the species about 200 miles north in the Rio Grande valley and is, so far as I know, the sixth specimen to be taken. It is now in the Biological Survey Collection at Washington, D. C.

Putorius arizonensis Mearns.

Professor G. E. Coghill shot three weasles on the Pecos Forest Reserve above Willis, New Mexico, on July 23d, 1898. The late F. J. Birtwell secured possession of them and I was permitted to examine them. They answer Dr. Mearns' description of the Arizona weasel and are apparently that species. The only measurements available are those of a female as follows: Total length, 332; tail vertebræ, 126; hind foot, 38 mm. These seem to be the first specimens of this species taken in New Mexico. Two of these specimen are now in the Museum of Comparative Zoology at Cambridge, and the third is in the A. & M. College collection at Mesilla Park, New Mexico.

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PROCEEDINGS

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GENERAL NOTES.

The occurrence of certain tropical plants in Mississippi.

The flora of the coastal region of Mississippi is made more interesting by the naturalization of some tropical shrubs, introduced for ornamental purposes. These are of three species: *Lagerstrœmia indica* Linn., the Crêpe Myrtle; *Zizyphus vulgaris* Lam., the Jujube Tree, and *Vitex agnus-castus* Linn., the Chaste-Tree.

The first of these species is still very common in cultivation; in the wild state it occurs as a shrub of rather bushy habit, from four to ten feet in height. The pink flowers are borne very profusely all summer, and through September.

Zizyphus vulgaris is cultivated to some extent as a lawn shrub, but is also spontaneous. Owing to the slight edibility of the fruit, and the large size of the seed, the plants are infrequently found outside of the limits of the yard where it is grown. The usual habit is bushy, and the average height about twelve feet, but in some cases the plant is a tree of eight inches in diameter, and twenty feet in height. The drupes are somewhat eaten by birds—*Mimus polyglottos* and *Melanerpes erythrocephalus.* The fruit ripens in August.

Vitex agnus-castus is now little cultivated, it is fairly common on the beach, growing in the sand, often below extreme high-water mark. It is usually a shrub less than ten feet high, but in one case, at Bay St. Louis, reaches a height of about twenty feet. The flowers appear in May.—*Andrew Allison, Bay St. Louis, Mississippi.*

Note on the generic name of the horseshoe crab.

Mr. Pocock in his article "The Taxonomy of Recent Species of Limulus" (Ann. Mag. Nat Hist. 7th ser., IX, p. 257, 1902), considers that the validity of the generic name *Xiphosura* rests solely on the Gronovian foundation. On the contrary, before 1785, the date of Müller's *Limulus*, *Xiphosura* was adopted by at least three binomial writers, viz: by Brunnich (Zoologiæ Fundamenta, p. 208, 1772), Scopoli (Introd. Hist. Nat., p. 405, 1777) and Meuschen (Mus. Gronov., p. 83, 1778).—*Mary J. Rathbun.*

A further note on the name of the Argentine Viscacha.

As has been fully shown,* there is no doubt of the pertinence of the generic name *Viscaccia* Schinz, 1825, to "la Vizcache," of Azara, the Argentine Viscacha. But it turns out that Oken (Lehrb. d. Naturg., Theil III, Abth. 2, p. 835, 1826) used the same term in 1816, in nearly the same sense. Oken included in his group or subgenus *Viscaccia* only two species: (1) *Lepus chilensis* and (2) *Mus laniger*. The first, notwithstanding the name *chilensis*, is based, as far as the description is concerned, wholly on "la Vizcache" of Azara, while in his diagnosis of the group *Viscaccia* he says "Zehen vorn 4, hinten 3," which would exclude his second species, the *Mus laniger* of Molina, and hence the Chinchilla of Peru. As Bennett in 1829, made the Chinchilla the type of his genus *Chinchilla*, the Argentine Vischacha also becomes by restriction the type and only species of Oken's *Viscaccia*, the authority for which name is thus Oken (1816) instead of Schinz (1825).

It also unfortunately happens that Oken's name *chilensis* has one year's priority over *maximus* of Desmarest† (*Dipus maximus* Desm. ex Blainville M. S.). Hence, apparently, the Argentine Viscacha must be called *Viscaccia chilensis* (Oken). From his account of the animal, he appears to have believed, as did Azara, that it was found in Peru, and also in Chili, as shown by his reference to the use made of its fur in those countries. He gives its distribution correctly, however, as follows: "In Paraguay ist es nur westlich des Flusses Uruguay, vom 30° B. gegen Süden, südlich von Buenos Ayres sehr gemein."

Oken was almost erratic and irregular in nomenclatorial matters, viewed from the standpoint of present day usuages, as was Zimmermann in his "Specimen Zoologiæ Geographicæ" 1777. His use of the generic names *Lepus* and *Mus* for the species he placed under *Viscaccia* will not surprise systematists who are familiar with the character of Oken's "Lehrbuch," although the name *Lepus chilensis* is apparently Oken's own name. It appears to have heretofore escaped citation.—*J. A. Allen.*

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*Cf. Palmer, Science, N. S., VI, p. 21, July 2, 1897; Thomas, Proc. Biol. Soc. Wash., XIV, p. 25, April 2, 1901; Allen, ibid., p. 181, Dec. 2, 1901.

†Nouv. Dict. d'Hist. Nat., XIII, p. 117, 1817.

On the generic names Notophorus, Alces, Dama, and Cephalotes, with remarks on the "one-letter rule" in Nomenclature.

Since, in a matter so essentially important as nomenclature, I look upon any obstinacy in upholding one's own opinions in doubtful cases as both childish and criminal, I gladly adopt the view advocated by Dr. Allen* that *Notophorus* Fisch. should be considered as a pure synonym of *Tayassu* Fisch., and therefore Dr. Merriam's *Olidosus* should stand. I do this mainly on the ground that Fischer's placing of *Tayassu* as equivalent to *Notophorus*, may be considered as synonymizing them *ab initio*, without discussing the reasons given by Dr. Allen against my acceptance of *Sus tayassu* Linn. Gmel. as a type species.

Dr. Allen's renaming of the Elk (Moose) on the ground that *Alces* is antedated and invalidated by *Alce* is of course in direct conflict with the principles advocated in my own remarks on *Callorhinus* versus *Callirhinus* and *Stenorhinchus* v. *Stenorhynchus*.† But far from thinking that the *Alces* case is one to cause hesitation in accepting what has been called the "one-letter rule," I look upon the resulting retention of so well and long known a name as *Alces* for the Elks as an instance in its favor. As Dr. Allen shows, this name has been used for the Elks for a long period by naturalists of all nations, and the fact that *Alce* would also be valid, for the fossil Irish Deer, is but a small drawback compared to the advantage of retaining *Alces*. When we look at the retention of other well known names affected by this rule, such as *Macroglossus*, *Heliophobius*, *Callorhinus*, &c., I think the balance of advantage will be on its side. Nor is it evident where a line is to be drawn between the extreme one-letter principle, and the confusion of such differently spelt words as *Prionodon* and *Priodontes*, or even *Odocoileus* and *Cœlodon*.‡ There appear to me to be only two alternatives in any given case—either (1) the two names are the same and should be spelt the same (old fashioned emendation combined with non-compatibility of words of like origin, or (2) the names being differently spelt, are to be treated as different, however nearly like (modern non-emendation, and its logical consequence the one letter rule). The position adopted by some writers of stoutly opposing emendation and at the same time objecting to the one-letter rule seems to me supported by neither logic nor classicality.

But with specific names the case is different. There, far from being barred, emendation, when demanded by classic correctness, is universally practiced, and no doubt rightly so. Its consequence therefore, the one letter rule, does not follow, and, while admitting both *Picus* and *Pica* as valid generic names, we should not dream of admitting both *picatus* and *picata* as valid specific ones in the same genus, for the reason that either would be emended to agree with the gender of the generic name, and would thus clash into the other. Similarly *græcus* and *grecus* could not be admitted side by side, nor *borneoensis* and *borneensis*, *canadiensis* and *canadensis*.

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*Bull. Amer. Mus. Nat. Hist., XVI, pp. 162 and 168. July 1, 1902.

†Supra p. 154.

‡The earlier of these has actually been said to invalidate the use of the later.

Besides the emendation reason for this distinction between the treatment of genera and species, it must be remembered that the chances are greatly against two closely similar generic names coming very near each other in the system, or being frequently used by the same person. On the other hand, to have two species of the same genus, and even from the same country, with closely similar names would produce the maximum of inconvenience, with no corresponding advantage in the direction of stability, uniformity or logicalness.

Dr. Allen quotes me as agreeing with him in the use of *Damà* for the American Deer, but I happened to be correcting the proofs of the description of "*Dama rothschildi*" when his paper came in, and I used the name without very close enquiry. On further consideration, however, I think I was wrong, and should now be disposed to adopt on this subject both Mr. Miller's conclusions* and his reasons for them, calling the Coiba Deer *Odocoileus rothschildi*.

In connection with disputed points in nomenclature I may take this opportunity of pointing out that *Nyctimene*, Bechstein†, with the type "*Vespertilio cephalotes*" Pallas, antedates *Cephalotes* Geoffroy (1810), and that the type of the latter should also be *V. cephalotes*, following the rule recently published in Science‡. The name *Cephalotes* will become a synonym of *Nyctimene*, and *Dobsonia* Palmer, will stand for the bat called *Cephalotes* by Dobson and Matschie.—*Oldfield Thomas.*

P. S. Sept. 1, 1902.

It has been objected that in the above note the undeniable difference between a mere adjectival declension such as *picat-us*, *-a -um*, and a more essential modification, such as from *Abrothrix* to *Habrothrix*, has been too much ignored, and that my arguments depend on there being no real difference between them. But this is not so, for quite apart from any such argument, I hold that since on the one hand such double forms as *græcus* and *grecus*, *canadensis* and *canadiensis* should not be both admitted side by side, and on the other that essentially similar forms of generic names such as *Pridontes* and *Prionodon* should be so admitted, a line has to be drawn somewhere between the two extremes, and that this line may most naturally, certainly and conveniently be placed between genus and species.

No other suggestions, so far as I know, have been made for the drawing of the line required, authors (like Dr. Allen in the case of *Alce* and *Alces*) who cavil at the one-letter rule not saying at what point they would cease to consider two similar words synonymous. Nor do I know what is the opinion of the extreme one-letter men about such specific names as those above quoted.—*O. T.*

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*Supra, p. 39.

†Syst. Uebers. Vierf. Thiere. II, p. 615. 1800.

‡Science, N. S. XVI, p. 114. July 18, 1902.

On the distribution of Hyla evittata Miller.

In my recent paper on the Batrachians and Reptiles of the District of Columbia I gave the known range of *Hyla evittata* as extending along the Potomac River from Four Mile Run to Little Hunting Creek, a distance of about fifteen miles. I have since learned from Mr. A. H. Howell that he has several times heard its unmistakable note in the neighborhood of Analostan Island; and Mr. G. S. Miller, Jr., has taken a specimen (No. 29,621, U. S. National Museum) at Quantico, some fifteen miles below Mount Vernon.

In early August of the present summer I secured one specimen and saw another in a small fresh water pool along the York River, about half a mile above Yorktown, Va.,

Mr. Howell's record probably represents the northern limit of the range of this species as I have repeatedly searched in favorable localities in the neighborhood of Plummer's Island and Great Falls without seeing or hearing it. I might also add that a careful search in a *Nymphæa* swamp in Accomack County, Va., failed to reveal it.—*W. P. Hay.*

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PROCEEDINGS

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TWO NEW VIOLETS FROM THE EASTERN UNITED STATES.*

BY CHARLES LOUIS POLLARD.

Viola tenuipes.

Stem simple, erect, 8-15 cm. high, from a short horizontal or ascending knotted rootstock emitting numerous long, thick fibrous roots; leaves, 3 to 5, usually 4, borne at the summit of the stem; blades glabrate, ovate-lanceolate or hastate-lanceolate, with a truncate base and acute apex, the margins repand-denticulate; stipules ovate, membranaceous; petiole 1-1.5 cm. long, appreciably shorter than the blade; flowers on filiform peduncles exceeding the leaves; sepals irregular, from linear-ovate to linear; corolla yellow, 1.5 cm. broad, the petals narrow, beardless, and quite free from markings; capsules smooth, ovoid.

In dry soil, northern Georgia and Alabama to Florida. Type from, Chattahoochee, Florida, March, 1897 in the Chapman herbarium, now the property of the Biltmore herbarium. The type sheet is a remarkably full one, bearing twelve individuals of uniform size and characters except that the rootstock of one of these produces two stems in place of a solitary one. A photograph of the type sheet is deposited in the U. S. National Herbarium. The species is also well represented by collections made at Auburn, Alabama, April 11, 1899, by Mrs. F. S. Earle; at Cullman, Alabama, May 1, 1901, by representatives of the Biltmore Herbarium; at Tuscaloosa, Alabama, by Professor Lester F. Ward; and at Rome, Georgia, by Dr. Chapman.

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The publication of this species is the result of a critical study of the violets belonging to the hastata group in the South, wherein my own field observations have been supplemented by information kindly given me by other collectors. For many years Elliott's *V. tripartita* was regarded as a variety of *V. hastata*, although the most superficial examination of the rootstock in the two species ought to have dispelled such an opinion. Yet even after Dr. Small had demonstrated this character it was noticeable to southern botanists at least that certain forms remained which could not well be disposed of in connection with either of these species. More recently Mr. Roland M. Harper* attempted to solve the difficulty by the reinstatement of Gingins' *V. hastata glaberrima*†, which he treated as an entire leaved variety of *tripartita*, remarking in this connection: "It differs from typical *tripartita* in having leaves all undivided and glabrous, but is in other respects very similar. It seems to extend farther south than the type, and is the plant which was taken for *V. hastata* in Florida." But Mr. Harper has here fallen into the very natural error of placing in a single category all the plants with undivided leaves, regardless of range, and his statement in the concluding portion of above quoted paragraph is also a trifle too broad. While much of the material referred by Dr. Chapman to *V. hastata glaberrima* has nothing in common with *hastata*, the latter species does, notwithstanding, occur in Florida, as is abundantly proven by excellent specimens in the Biltmore Herbarium, collected in Liberty County. A mere glance at the whitish, succulent, tuberous rootstock is sufficient to establish the identity of this species.

Let us now examine the range of the dubious forms under consideration. The type of *V. tripartita* came from Athens, Georgia, and the species has been collected there by many different persons since Elliott's day, so that we have no difficulty in establishing a positive diagnosis of its characters. North of this point it ranges through the mountains of North and South Carolina and eastern Tennessee, being common near Biltmore, N. C., where I have carefully studied it. Throughout this range, and nearly always associated with the typical form, as shown by notes on collector's labels, is a plant of almost identical appearance, except that the leaves are undivided and have a tendency to become glabrous with age. This is the true *glaberrima*, which may well stand as a variety of *tripartita*, where it has been placed by Mr. Harper.

If now we examine the collections from south of Athens, we find an entire-leaved yellow-flowered violet represented in abundance, but no *tripartita*. It is this plant which was familiar to Dr. Chapman in Florida, and which Mr. Harper has confused with the more northerly form. *V. tripartita* and its variety are relatively tall, coarse plants, even at flowering time, having flowers with the corolla distinctly veined, and with rather broad sepals. This violet is very slender, of remarkably uniform size, with smaller flowers, quite immaculate petals, and leaves strongly suggesting those of *hastata*, while the leaves of *tripartita glaberrima* resemble rather those of *V. scabriuscula* in shape. This species, which I have described above under the name *tenuipes*, is of southern range exclusively. From the true *hastata*, which also occurs in Florida, it may be distinguished by the rootstock, which is of the same type as that of *tripartita*.

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*Bull. Torr. Club. 27: 337. 1900.

†Gingins in D. C. Prodr. 1: 300. 1824.

I wish to express my appreciation of the courtesy of Mr. C. D. Beadle, Curator of the Biltmore Herbarium, for the loan of many sheets of specimens, and to Mr. Frank Boynton, of the same institution, for assistance in field work.

Viola Mulfordae.

Acaulescent, tufted, from a short, thick and nearly vertical caudex: scapes and foliage finely puberulent; leaf-blades oblong or ovate-oblong outline, in the earliest 1.5-2 cm., the latter 3-4 cm. long; the margins coarsely crenate, frequently incised at base with one or more lobes, the apex very obtuse; petioles about twice the length of the blades; scapes 12-15 cm. high, surpassing the leaves; flowers deep violet-purple, nearly 2 cm. broad; sepals linear-lanceolate, finely ciliate; petals obovate, very obtuse, copiously bearded at the base with glistening white hairs; scapes of the cleistogenes evidently erect.

Type, No. 404,998 in the United States National Herbarium, collected by Miss F. A. Mulford at Hempstead Plains, Long Island, N. Y., May 13, 1902. The species belongs to the coastal plain region, its affinities being with *V. Brittoniana* , with which it is found growing. Miss Mulford was the first to detect the obvious differences in both flowers and foliage, and after a full season's observation of both plants in the field concluded that they should not be referred to the same species. In recognition of her courtesy in contributing material and the result of her investigations, I take pleasure in naming the plant as above. It will be remembered that the leaves of *V. Brittoniana* are distinctly ovate in outline and pinnately lobed, while the flowers are of another shade, and do not exhibit the white pubescence.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

AN ADDITION TO THE CORAL FAUNA OF THE AQUIA EOCENE FORMATION OF MARYLAND.

BY T. WAYLAND VAUGHAN.

Since my report on the Eocene corals of Virginia and Maryland, published by the Maryland Geological Survey*, was written, Mr. Chas. Schuchert and Mr. R. S. Bassler have collected some interesting specimens at upper Marlboro, Maryland, making one important addition to the fauna. The additional species for this locality, collected by these gentlemen are *Paracyathus marylandicus* Vaughan (collected by Mr. Schuchert), originally described from Piscataway, Maryland, and *Haimesiastræa conferta* Vaughan (collected by Mr. Bassler), the types coming from Gregg's Landing, Alabama. The first species has no especial geologic significance, although it is interesting to be able to note it from another locality. The second species is represented by a single small and imperfectly developed specimen, but possesses much importance, as it had hitherto been found only in Alabama, where it ranges in the Eocene from the Midway to the Wood's Bluff, its best development being in the Gregg's or Bell's Landing horizon. The occurence of this species is additional evidence for correlating the Aquia formation with the Gregg's Landing horizon, but what is much more important, it is the first compound coral that has been found in the Eocene of Virginia and Maryland, and shows a northward range of an Alabaman species. The physical conditions, however, apparently were not favorable for luxuriant growth. Two factors were probably active. Apparently the Aquia deposits were laid down in water somewhat deeper than those of the same age in Alabama. More probably the most important factor was the colder temperature in the Maryland-Virginia region. Both deep water and low temperature are detrimental to a development of colonial corals, especially those that tend to be somewhat or pronouncedly massive.

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*Eocene, 1901, pp. 222-232, pl. LXI, figs. 3-15.

The species previously known from the Aquia formation are: *Flabellum* sp., *Turbinolia acuticostata* Vaughan, *Trochocyathus clarkeanus* Vaughan, *Paracyathus marylandicus* Vaughan, *Balanophyllia desmophyllum* Milne Edwards and Haime, and *Eupsammia elaborata* (Conrad). Only the last two species were known to occur also in Alabama. The *Flabellum* may be dropped from the list, as it could not be specifically determined. Now of the six determined species (including the addition of *Haimesiastræa conferta*), we have three common to the Aquia formation of Virginia-Maryland and the Gregg's Landing horizon of Alabama.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A REDESCRIPTION OF THE CORAL *PLATYTROCHUS SPECIOSUS*.*

BY T. WAYLAND VAUGHAN.

I was obliged, because of the imperfection of the original description and the inadequacy of the figures, to place *Platytrochus speciosus* Gabb and Horn in the category of "Doubtful Species" in my memoir on the Eocene and Lower Oligocene Coral Faunas of the United States.† Through the kindness of Professor L. C. Glenn, of Vanderbilt University, who has recently sent me the types, I am now able to present a new description of the species and to give figures, from drawings by Dr. J. C. McConnell.

Trochocyathus speciosus (Gabb and Horn).

Figs. 1, 1*a*, 1*b*, 2, 2*a*.

1860. *Platytrochus speciosus*, Gabb and Horn, Journ. Acad. Nat. Sci. Phila., 2nd ser., Vol. IV, p. 399, pl. LXIX. Figs. 15, 16, 17

1900. *Platytrochus speciosus*, Vaughan, U. S. Geological Survey, Mon. XXXIX, p. 196.

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*Published here by permission of the Director of the U. S. Geological Survey.

†U. S. Geological Survey, Mon. XXXIX, 1900.

Not *Platytrochus speciosus*, C. W. Johnson, Geological Survey, New Jersey, Ann. Rep. for 1897, p. 265, 1898; *Platytrochus speciosus*, C. W. Johnson, Proc. Acad. Nat. Sci. Phila., 1898, p. 462, =*Trochocyathus woolmani*, Vaughan, Proc, Acad. Nat. Sci. Phila., 1900, pp. 436, 437, figs. 1, 2, 3.

Corallum inversely conical, slightly curved, living attached by a rather small base, transverse outline elliptical.

DIMENSIONS:

	Greater transverse diameter of calice	Lesser transverse diameter of calice	Height of corallum
Specimen 1.	13.5 mm.	11.5 mm.	12.25 mm.
Specimen 2.	11 "	10 "	11 "

The transverse measurements are made to the outer edge of the costæ.

Wall thin around upper edge, thicker below.

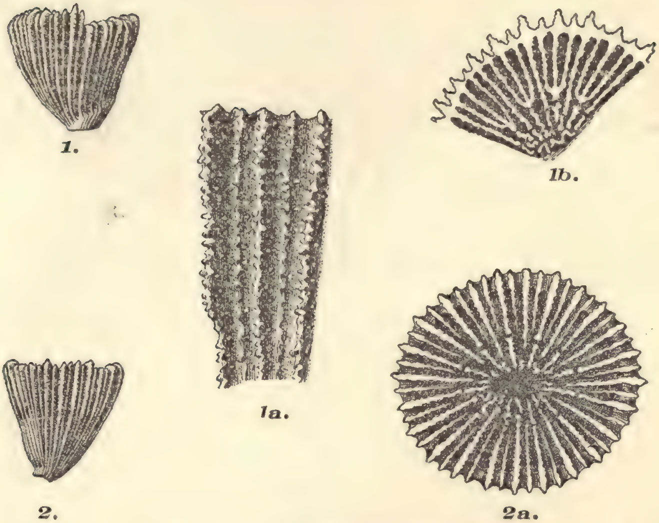
Forty-eight costæ, which are rather prominent, regularly alternately larger and smaller, gradually decreasing in size and prominence as the base is approached. Those corresponding to the fourth cycle of septa are continued very near or actually to the base. Their edges are acute, may be transversely undulated, serrately or crenately dentate, the serrations not very tall; small granulations on the sides. No vestige of epitheca discernible.

Septa rather thin, thicker at the wall, in four complete cycles, grouped into six distinct systems. Members of the first and second cycles free; those of the fourth joining by their inner margins to the sides of the third. The upper margins of the larger septa may project as much as 1.25 mm. above the edge of the wall. Septal margins entire or very faintly crenate. Lateral ornamentation, of granulations arranged along definite lines, with the line of divergence interior to the wall.

Pali in two distinct crowns. Those before the septa of the first and second cycles are situated far down in the calice, but still distinctly above the upper surface of the columella and are narrow. Those before the third cycle extend high up into the calice, and are quite wide, usually about twice as wide as those first described. All of the pali are thin and transversely undulated.

The calice is deep, I would say that its depth is about half the height of the corallum. The upper surface of the columella is suddenly sunken.

Columella well developed, fascicular, composed of numerous twisted, coalescing irregular laths. Its upper termination is not papillose, being formed by the upper ends of the irregular laths.



Cotypes of PLATYTROCHUS SPECIOSUS.

Fig. 1. General view of specimen, height, 11.25 mm.; Fig. 1a, costæ of the same specimen considerably enlarged; Fig. 1b. two systems of septa, showing pali, of the same specimen, slightly diagrammatic; Fig. 2. general view of another specimen, height, 11 mm.; Fig. 2a, calice of the same, greater diameter, 11 mm. [Figures reproduced through the courtesy of the Director of the U. S. Geological Survey.]

*Locality.**—"M. & C. R. R. or Walker's Bank, at Tennessee State Line, Hardeman County, Tennessee."

Geological Horizon.—"Midway Eocene."

Cotypes.—No. 87. Department of Geology, Vanderbilt University. Two specimens.

Remarks.—This species presents an individuality so striking that comparisons with other species can scarcely be made. I pointed out in describing *Trochocyathus woolmani* two important differences between the two species, basing my comparison on Gabb and Horn's brief original description, viz: that *T. speciosus* is three times as large as *T. woolmani* and that its calice is much deeper. A third difference is that the former possesses one more cycle of septa than the latter, even when the specimens of the two species are of the same size.

T. speciosus bears considerable external resemblance to occasional large specimens of *Paracyathus alternatus* Vaughan. The pali and columella are quite different, and even in form there is discernible difference. The ratio of the diameters of the calice to the height of corallum is greater in *T. speciosus*, i. e. the diameters of the calice in *T. speciosus* are relatively greater than in *P. alternatus*.

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*Taken from the label accompanying the specimens.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SUBSPECIES OF THE CUBAN CLIFF SWALLOW.

BY E. W. NELSON.

The discovery of a subspecies of *Petrochelidon fulva* occupying a limited area on the Mexican tableland, remote from the seacoast, between the ranges of *P. melanogaster* and *P. lunifrons*, and apparently not intergrading with either, is one of those curious cases of distribution so difficult to understand.

A similar and even more striking case is the presence in the mountains of Sinaloa of a marten (*Progne sinaloæ*) closely related to *P. dominicensis* but with its habitat surrounded by the territory occupied by *P. subis* and *P. chalybea.*

Petrochelidon fulva pallida new subspecies. Coahuila Cliff Swallow.

Type No. 183,703 ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Saltillo, Coahuila, Mexico, April 17, 1902, E. W. Nelson and E. A. Goldman.

Distribution.—Arid border of table-land in northeastern Mexico in portions of Coahuila and Nuevo Leon.

Subspecific Characters.—Similar to *P. fulva* from which it differs in the slightly larger size and paler colors. The rufous frontlet is only a little paler but the nuchal collar and rump are decidedly paler and more rusty rufous. The wash of reddish on sides and underparts of head and neck is paler and is usually absent along sides of breast and body. The dark centres of under tail coverts average paler.

Dimensions of type.—Wing, 108; tail, 50; culmen, 7; tarsus, 12.

Remarks.—The amount of differentiation of this form from the Cuban bird is very slight considering their isolation from one another and the great differences of physical surroundings in the homes of the two forms.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

OBSERVATIONS ON THE CONDITIONS OF LIGHT PRODUCTION IN LUMINOUS BACTERIA.

BY RANDOLPH E. B. McKENNEY.

Introduction.

Although the phenomenon of the production of light by organic or organized matter was known in the days of Aristotle, comparatively little is known concerning the actual conditions of luminescence. The number of organisms or organic bodies said to possess the so-called phosphorescent* properties is a large and varied one. Both animal and plant forms, simple and complex types of life, are to be found in the category of light-producing organisms.

In view of the comparative ease of culture and simplicity of form, the photogenic bacteria constitute perhaps the best material for the study of luminescence in living forms—a phenomenon, the essential conditions of which are probably the same in all forms of life. The study of the conditions of luminescence was undertaken at the suggestion of Prof. Dr. W. Pfeffer and was carried out in the botanical laboratories of Leipzig and Basel. It is a pleasant duty to here give expression to my appreciation of the friendly counsels of Professors W. Pfeffer and A. F. W. Schimper during the course of my experiments.

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*The term phosphorescence as applied to the light produced by luminous organisms is inappropriate. It should only be applied to light emitted in the dark by bodies which have been previously illuminated. The light emitted by all known luminescent forms of life is entirely independent of previous illumination.

Literature.

It is only a quarter of a century since Pflüger discovered the first luminous bacterium—*Micrococcus phosphoreus*, Cohn.* Previous to this discovery, Pflüger had expressed the belief that the (so-called) phosphorescence phenomena would prove to be intimately connected with the respiratory processes. He obtained confirmation of this belief when by experiment he showed the need of free oxygen for the production of light by the newly discovered bacterium. Since light production then seemed bound up with respiration, Pflüger asserted that luminescence was a vital phenomenon—that it was inseparably bound up with life. Those who had studied luminosity in animals before Pflüger's discovery of luminous bacteria had arrived at the conclusion that it was the protoplasm which was luminous—that the luminous matter was "lebendiges Eiweiss." Pflüger's experiments apparently confirmed this position.

In 1880, Radziszewski attacked the question from the chemical standpoint. It had previously been known that certain substances when raised to a certain temperature could be made to emit light. Radziszewski discovered a large number of additional non-living organic compounds which could be made to give out light. He also found that in many cases a high temperature was not required and that with lophin no higher temperature than 10° was needed. Further he ascertained that the conditions of luminescence were a markedly alkaline reaction and a slow oxidation. Organic and inorganic bases might be employed to produce the alkaline reaction. The light produced by these substances has a spectrum very closely resembling that of the photogenic forms—giving a continuous band between D and G, with the brightest part between E and F. In view of the resemblance of the spectra of the light produced by these chemicals and by luminous organisms, Radziszewski is of the opinion that the light of luminous organisms is due to the presence of certain of the photogenic substances which he discovered. While Radziszewski differs from Pflüger in holding luminescence not to be a vital phenomenon, yet both agree that oxidation plays a very important rôle in luminescence. Dubois records a symbiotic relation between a marine mollusk and a species of bacterium. In this case Dubois asserts that the animal excretes a substance "Luciferin" which through action of the bacterium is caused to emit light.

Beijerinck, who has studied a number of forms, finds that light ceases with the death of the bacteria and that the light intensity may be diminished or increased by varying the nature of the nutrient media. His conclusion concerning luminescence is, that it is a vital process—that it is due to the liberation of radiant energy by the oxidation of peptone at the moment of its conversion into living protoplasm.

The observations of B. Fischer, Forster, Lehmann and Tolhausen of the production of light at and below 0° seem hardly to agree with the theory of the vital nature of luminescence. However, these observers hold that inasmuch as no luminous substance has ever been isolated from photobacteria, luminescence must be inseparable from life. Ludwig, and with him Dubois, is of the opinion that the light is produced by some specific substance, similar to those discovered by Radziszewski.

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*Since 1875 there has been as many as twenty-five species of luminous bacteria recorded from widely separated parts of the world. In all probability, many of these species names will prove to be synonyms, or at least varieties.

As the matter rests now, there is almost as much evidence for the "luminous substance" theory as for the intracellular vital theory; the latter having, however, slightly the better of the argument. In order to come a little nearer to the cause of light production, I decided to examine more minutely into the nutrition of the photobacteria and the effect of various external agents on the light production.

Material.

Most of the succeeding observations and experiments were made with *Bacillus phosphorescens*, B. Fischer (*Photobacterium indicum*, Beij.) and *Microspira luminosa*, (Beij.) Mig. (*Ph. luminosum* Beij.). Some experiments were also made with *Bacterium phosphorescens*, B. Fischer, (*Ph. phosphorescens*, Beij.). Cultures of these species were obtained from Kral's laboratory in Prague. The culture of Microspira luminosa thus obtained emitted a weak light. Strongly luminous cultures of this species were obtained, however, through the kindness of Prof. Dr. Beijerinck, of Delft.

The morphologic characters of the above mentioned species are quite fully set forth in the papers of Beijerinck and in Migula's "System der Bakterien." It may simply be noted here that the Bacillus and Microspira are motile and liquefy gelatine, while the Bacterium is non-motile and does not liquefy gelatine. When not otherwise indicated the results recorded will refer to *Bacillus phosphorescens.*

General Methods of Culture.

For most of the experimental work a liquid culture medium was found best, but control experiments were frequently made with solid culture media. About 500 grams of fresh fish were extracted over a water bath with two litres of water. Herring, pike and carp yielded good extracts, but that obtained from a couple of species of flounder was decidedly less favorable to both growth and light production. To the filtered fish extract the following ingredients were added:

Peptone	1.0%
Asparagin	.5%
Glycerol	2.0%
Na Cl	2.0%
Mg Cl_2	1.0%

The liquid thus obtained was made weakly alkaline with Na OH, and constitutes what will later be designated as normal fish bouillon. Appropriate solid media were obtained by adding to this bouillon either 1% of good agar or 6 to 8% of best grade gelatine.

As containers for the bouillon, Erlenmeyer flasks of ca. 100 c. c. capacity were employed. From 10 to 20 c. c. of the bouillon was introduced into each flask. The broad base of the flask at once insured stability of the cultures and permitted access of free oxygen to all parts of the media.

Relations to Acids and Bases.

In his study of *Bacterium phosphorescens*, Beijerinck came to the conclusion that certain acids, e. g. lactic, malic, glyceric and aspartic, accelerated light production, while others, such as formic, acetic, propionic and butyric decreased light emission. Still others, e. g. citric, mucic. oxalic and glycolic, appeared to be without effect on the bacterium. Beijerinck further observed that certain of the salts of these acids reacted toward the bacteria much as did the free acid. That free acids should in all cases prove injurious, or even that they should all be beneficial, would not be particularly surprising, This variation in the action of the acids was, however, difficult to understand.

A quantity of normal fish bouillon, agar, and gelatine were made weakly acid with HCl, HNO_3, H_3PO_4 and CH_3COOH respectively. These media were then inoculated with *Bacillus phosphorescens* and *Bacterium phosphorescens;* but no growth ever appeared. Since the acid might perhaps inhibit initial, but not later growth, and not the light production, luminous cultures were obtained in normal media and the acids then added.

To a stab gelatine culture of *Bacterium phosphorescens*, 4 drops of decinormal HCl were added with a pipette. The acid was dropped directly *on* the bacterial growth. The light was instantly extinguished. During the 6 hours following treatment no light was emitted, but after 24 hours a faint light was visible in the culture. This experiment was repeated a number of times and each time with the same result. Evidently the acid was injurious to light production, but not for the life of the organism.

In a second series of experiments, cultures in normal fish bouillon were employed. To such cultures, which were strongly luminous, 4 drops of decinormal HCl were added. No effect on light emission was observed. Examination showed that the amount of HCl added had not been sufficient to give the medium an acid reaction. Decinormal HCl was then added to another lightning bouillion culture until the light emission ceased. The culture fluid was then found to be slightly acid to litmus paper.

Normal, double normal, and fairly concentrated HCl were in turn added to a series of light-emitting bouillon cultures until the light disappeared. In each case the media at the end of the experiment were slightly acid to litmus. Naturally the more concentrated the acid the less was required to cause cessation of light production. In no case, however, did the light disappear until the media became slightly acid. The experiments were repeated in bouillon cultures containing litmus. In all cases light disappeared as soon as the medium turned faint red, i. e., was acid, and not before.

One may interpret the difference between the results obtained with solid and fluid cultures by the fact, that with the solid media the acid acted at once on all of the bacteria, while in fluid culture only some of the bacteria were subject to the action of the acid before its neutralization. Immediately the media became acid, i. e., the moment all the bacteria were subjected to the action of the acid, the light instantly disappeared.

Numerous experiments with nitric, sulphuric, orthophosphoric, formic, acetic, lactic, succinic, malic, tartaric, oxalic and citric acids, gave results essentially the same as those obtained with hydrochloric acid. At the moment the media turned just weakly acid, the light emission at once ceased. Naturally, in proportion as the normal acid was weak, or the acid dilute, so was the actual quantity of acid solution required to give an acid reaction to the medium and destroy light, the larger. The end result of a dark culture and slightly acid reaction of the medium was the same in all cases.

A few experiments were made to learn the effect of the acid salts. The dihydric phosphates of sodium and potassium—NaH_2PO_4 and KH_2PO_4—were employed for this purpose. Quite large quantities of the solutions of these salts were needed to render the culture media acid. In each case, however, as soon as the medium became slightly acid, the culture became at once dark.

In cultures thus treated with acids the light never returned. In most cases, even when the culture was made weakly alkaline within five minutes of the acid treatment, light did not again appear in the culture. In cultures which had been made alkaline after acidification with the acid phosphates, light was again emitted within 12 hours of the addition of the alkali.

A few experiments to learn the effect of excess of Na OH and KOH in the media were also tried. Growth only occurs in media which turns red litmus light blue. If 2 to 4 drops of decinormal KOH or NaOH be added to a good luminous bouillon culture light production ceases instantly, and subsequent reduction of excessive alkalinity never permits any return of light. Inoculations made from such cultures do not take, showing the bacteria to have been killed and not simply rendered inactive, as is the case when light is destroyed by acids.

The experiments here recorded for *Bacterium phosphorescens* were repeated with *Bacillus phosphorescens* and *Microspira luminosa*. Like results were obtained with both.

It may be well to briefly note here the methods employed for the introduction of reagents into the cultures. In the preliminary experiments the cotton plug was removed, the quantity of sterile reagent quickly introduced with a pipette and the cotton plug at once replaced. Although experience showed that there was rarely any bacterial contamination by this method, still there was the danger. Since the cultures were kept under observation for some days after treatment, a method of experimentation was devised which entirely precludes bacterial contamination during the course of the experiment.

Small glass tubes were taken, drawn out to form small capillary tubes and on one end of such a tube a very thin-walled bulb was blown. Care was taken to have the walls of the tube heavier than the bulb wall. A measured quantity of the desired reagent was introduced into the bulb and the open end of the tube sealed. The tube was then shoved through the cotton plug so that the bulb was just a little distance above the culture fluid in the bottom of the flask. The tube and bulb with the contained reagent were found light enough to be held in place by the cotton plug. The arrangement is shown in Fig. 1.

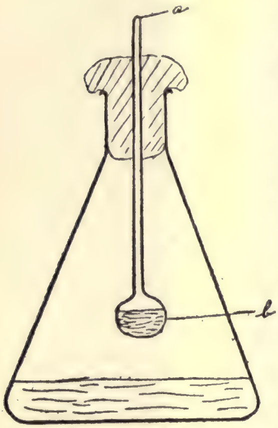

Fig. 1. Diagram of culture flask and bulb for introduction of sterile reagents.

The whole, containing culture media and reagent was sterilized in the usual way, the cotton plug slightly raised to permit the insertion of the needle and the media inoculated. When the culture is luminous and the reagent is to be applied, one presses on the end of the tube (a) and the bulb (b) is pressed against the bottom of the flask and shattered, bringing the reagent in direct contact with the bacteria. In this method, the only danger of contamination is that which is usually incidental to inoculation, and this experience shows to be extremely small.

The acids used in these experiments include mona-, di-, and tribasic members of both the inorganic and organic series. Since these representative acids all destroyed light emission and often the life of the organism, it seems probable that all acids would react in the same way. My results, then, are opposed to the conclusion of Beijerinck. I find all acids to be injurious to light production, lactic and malic (which Beijerinck distinctly labels photogenic) fully as much as citric and acetic (which he classes as indifferent and injurious respectively).

A consideration of Beijerinck's methods may explain his results. In the auxanogram method which he used, the reagent was dropped on a nutrient gelatine plate containing a rich bacterial growth. The acid diffused in radiating fashion from the point of contact, and as the diffusion circles widened, the reagent came in contact with the bacteria. Now the effect noted could not have been that of the free acid, since the moment the acid came in contact with the gelatine it would react with the contained alkali and form a salt. Consequently the effect noted must have been that of a probably neutral salt and not that of the free acid. The beneficial effect of the salts of certain acids noted by Beijerinck, I have been able to confirm. It is clear then that the error in Beijerinck's account, as far as acids are concerned, is not one of result but of interpretation of these results, since his experiments did not show the effect of the free acid, but rather of its salts.

The few experiments conducted with the hydrates of sodium and potassium show that while the photobacteria thrive in and, in fact, need a slightly alkaline nutrient medium, still the maximum point is rather sharply defined, and but a slight excess over that is even more fatal than an excess in the other direction.

Relations to Temperature.

Aside from some observations as to the maximum, minimum and optimum temperatures for light production, nothing has been recorded as to the relations of photobacteria to temperature. If the phenomenon of luminescence be primarily an irritabile function, we would expect to find evidence of this in the relations of the organisms to temperature. It must be borne in mind, however, that the term irritability rather expresses our ignorance than our knowledge of the phenomena usually classed under that designation. And this is especially true for the lower forms of life.

In the subjoined tables I give the earlier as well as my own records for the temperature minima, maxima and optima for both luminescence and growth in the three species I have examined.*

		Beijerinck	Migula	Fischer	Lehmann	Forster	Ludwig	McKenney
BACILLUS PHOSPHORESCENS								
Maximum	Growth							39°
	Light							30° (35°)
Optimum	Growth	Above 24°	20–30°					22–28°
	Light	30–35°	25–30°					22–28°
Minimum	Growth							15°
	Light							15°
MICROSPIRA LUMINOSA								
Maximum	Growth							30°
	Light	20°						22°
Optimum	Growth							15°
	Light	15°						15°
Minimum	Growth							10°
	Light							10°
BACTERIUM PHOSPHORESCENS								
Maximum	Growth					35–37°		38°
	Light		32°		39.5°	32°	38–39°	30°
Optimum	Growth							15–20°
	Light	10–15°	15–24°	5–10°	24°		15–20°	15–20°
Minimum	Growth							10°
	Light			0°	-12°	0°	10°	10°

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*Here and wherever else in my paper temperature records are given they are according to the Centigrade scale.

It will be noticed that not only are the previous records fragmentary, but as the observers have multiplied there has been a diversity of result. As a result of my observations I am convinced that the optimum temperature for growth is the same or very nearly the same as that for luminescence.

Concerning the minimal temperature for luminescence the records are remarkably diverse, having a range of over twenty degrees. In all of my experiments the lowest temperature for luminescence *coincided* with that for growth. This does not mean, however, that the life becomes extinct below the minimal growth point. I have repeatedly kept cultures at 10°, at 0° and at -5° between 24 and 60 hours, and while there was never any growth at these temperatures, still when the cultures were subsequently placed at the optimal temperature a good growth and good luminescence resulted. The light, however, obtained in such cultures, particularly in those which had been kept below 0°, was especially brilliant, fully twice as strong as that of control cultures which had been kept at the optimum from the time of inoculation.

In neither of the three species was I able to observe light below 10° and I am of the opinion that the light which Lehmann observed in *Bacterium phosphorescens* at -12° must have been flourescence rather than true luminescence.

EFFECT OF TEMPERATURE CHANGE.

Having established the minimal, maximal and optimal temperatures, I next endeavored to determine the effect of change of temperature on light production. Good luminous cultures of Bacillus phosphorescens which had been grown at 26° were placed at 20°. Although these cultures were kept under continuous observation for 1 hour, no change was observed in the intensity of the light emitted. Again, luminous cultures were taken from 26° and placed at 15°. In from 12 to 15 minutes light emission ceased, and did not again return in 24 hours. The cultures were then placed at 26° and in the course of 30 minutes they were again luminous. In these changes of temperature the change as ascertained by a thermometer kept in the culture was comparatively slow and gradual.

Luminous cultures from 26° containing a thermometer, were plunged into water of a temperature of 5°. In from 1 to 2.5 minutes (a variation due probably to thickness of flask), the temperature of the culture had reached 15° and in 15 to 20 seconds more the culture had reached a temperature of 12°. The light intensity remained bright and even until between 14° and 15° was reached, when it instantly disappeared. Some of the cultures were kept between 10° and 12° for an hour and throughout this time no light was emitted. After a few minutes exposure at 12° some of the cultures were raised to a temperature of 15° in 10 seconds by plunging in hot water. Immediately this temperature had been obtained a weak light appeared, and when the culture had reached 25° the light was very brilliant. Of the cultures which had been kept between 10° and 12° for 24 hours some were slowly, others rapidly, raised in temperature. In those in which temperature was gradually raised, the luminescence at once appeared as soon as the culture had reached 15°. In those in which temperature was rapidly raised by plunging in hot water, a temperature of 25° was obtained in 30 seconds, and with it strong luminescence.

The effect of changing from the optimum to a higher temperature was next studied. Cultures from 26° were gradually (in 15–30 minutes) raised to a temperature of 30°. Light continued with unabated brightness until 29.8° or 30.1° was reached and then the cultures immediately became dark.

Luminous cultures from 26° were plunged into water of 70°. In from 1 to 1.25 minutes the cultures were at 45° and the light instantly disappeared. Some of the cultures were slowly (15 to 20 minutes), others quickly (2 minutes) brought back to a temperature of 26°. Luminescence did not begin, however, as soon as the optimum had been reached. Usually it was from 10 to 12 hours after such treatment before the cultures were again luminous.

A number of experiments were also made in which old cultures that had ceased to emit light, and young cultures which were not yet luminous, had their temperatures raised and lowered, both gradually and rapidly. In no case, however, did any luminescence result, except in the very young cultures, which emitted light at the time in which untreated control cultures were also luminescent.

ACCOMMODATION.

In the preceding experiments it was found that for a very short period (1–2 minutes) it was possible to have luminescence as much as 15° above the normal maximum temperature for light production. Accordingly it seemed desirable to learn whether the bacteria would adapt themselves to life at higher temperatures and emit light. From the tables it will be observed that growth is possible for 9° above the normal maximal point for luminescence.

Normal fish bouillon (*a*) was then inoculated with *Bacillus phosphorescens* and placed at 35°. A good growth was soon noticed, but during two days no light was observed. From these cultures fresh inoculations were made into another lot (*b*) of media. A rapid growth occurred, but no light was produced. After 24 hours growth, fresh inoculations were made into a third lot (*c*) of media. In these cultures growth was luxuriant like the preceding, but no light appeared in 24 hours. Inoculations were again made to a fourth lot (*d*) of media. Growth was good in these cultures, but they still remained dark, and after 24 hours transfer was made to a fifth lot (*e*) of media. In these cultures not only was the growth good, but 12 hours after inoculation a weak light was observed. A little while before this (2 hours) a weak light was also noted in the *d* cultures, which were then 34 hours old. Transfers were successively made from the *e* set of cultures to sixth set, *f*, and from *f* to a seventh set, *g*. All of the *f* and *g* cultures became luminous in from 12 to 18 hours from time of inoculation. This experiment was twice repeated and the same result obtained.

Evidently, then, *Bacillus phosphorescens* is capable of so adapting itself as to produce light at a higher temperature than the normal maximum for light production. This new race thus obtained by adaptation to environment was, however, rather delicate. When kept at a temperature above the growth maximum for a few minutes the bacteria did not again emit light, either when brought back to 35° or even to 26,° until they had been previously transferred to fresh media; and then it was a new generation which produced light. Again, exposure to a low temperature showed this new race to be quite weak. After 24 hours exposure to a temperature of 0° it was usually 48 hours after a gradual or sudden change to either 26° or to 35° before light was again produced. I was unable to observe any adaptation above 35°.

These experiments show that neither sudden or gradual changes of temperature within the limits for light production affect the intensity of light. Further, while the bacteria may adapt themselves to higher temperatures and produce light above the normal luminescence maximum, still this is not possible for low temperatures, since the minimum temperatures for growth and luminescence are coincident. It is further to be noted that notwithstanding the greater adaptability for light production at higher temperatures, exposures to temperatures but slightly above the growth maximum are much more injurious than exposure to temperatures much below the growth minimum. Very low temperatures appear to act as a stimulus, since subsequent luminescence is far stronger than in cultures kept continuously at the optimum temperature. This was the only stimulating effect produced by temperature which was observed.

Relations to Illumination.

Only Dubois has noticed any effect of illumination on luminescence. He observed a slight dimunition of light production as a result of continued illumination. My observations do not show such an effect.

Good young luminous cultures were placed at various temperatures between the minimum and maximum for luminescence. These were divided into three lots; one was kept in continued darkness, another in alternate light of day and darkness of night, and still another exposed continuously to a 16 candle power incandescent light placed 2 feet away. These three sets of cultures were kept under observation for 48 hours. At the end of that time all were luminescent and there was no evident difference in the intensity of the light of any of the cultures.

Apparently a certain amount of continued illumination is without effect on the power of light production. It is, however, not only possible, but also probable that *very* strong illumination would not only destroy luminescence, but also the organisms as well.

The Effect of Ether.

One c.c. of ether added to a luminous culture of *Bacillus phosphorescens* at once destroys luminescence. This effect is, however, as much physical as physiological, for the ether spreads as a thin film over the surface of the culture and excludes free oxygen.

To ascertain the physiological effect of the ether, it was used both in water solution and in vapor form. To good luminous bouillon cultures 10% ether water was added in sufficient amount to make 1% ether in the culture. In all such cases the light was at once extinguished. After 2 to 3 hours, however, the cultures were as brightly luminous as ever. When 5% ether water is added in sufficient amount to have .5% ether in the culture, luminescence does not cease or only after from 30 to 45 minutes and then the culture rarely remains dark for about an hour. The light return is in all probability due to the evaporation of the ether. While .5% of ether in the culture may then at times cause narcosis, as much as 1% is to be considered as about the minimum amount needed to regularly produce narcosis.

In order to determine whether all or only some of the activities of the organism were held in abeyance, the effect of the prolonged action of ether was investigated. To good luminous cultures 5% ether water was added in sufficient amount to make .5% ether in the culture. The culture thus treated was placed together with an open dish of 5% ether water under a large bell-jar. The size of the bell-glass insured a sufficient quantity of free oxygen and at the same time retained the ether vapor. In the course of 15 to 35 minutes light was no longer evident in the cultures and they remained dark while under observation which lasted, in some cases 3 days, in others 1 week. The growth in the cultures was meanwhile luxuriant. It is noteworthy however, that a surface film was rarely formed and that the growth was quite evenly distributed throughout the liquid medium. Further the red discoloration and consequent rich production of the lower fatty acids, appeared much later than in untreated cultures. Usually the red color and the fatty acids appeared in from 4 to 5 days after inoculation. In the cultures thus treated with ether this condition did not appear until 1 week or 10 days after inoculation.

Since the photobacteria showed themselves capable of some adaptation to high temperatures, the thought occured that perhaps there might be a similar adaptability to ether. From cultures which had been exposed to the effects of ether as above described for 24 hours, transfers were made to fresh media (*B*) and to these *B* cultures .5% ether added and the daughter cultures placed with the parents under the bell-glass together with the open dish of ether water. The growth in the *B* cultures was luxuriant but no light was produced. After 24 hours growth of the B cultures under ether influence, transfers were made to a third set (*C*) of media. The growth in *C* cultures was good and after 24 hours the cultures were markedly luminescent. Transfers were made to a further set (*D*) of media and these too in 24 hours exhibited not only luxuriant growth but a strong luminescence. It is to be noted that at every transfer—every 24 hours—the bell-glass was removed a few minutes. When the bell-glass was replaced, a dish of freshly prepared 5% ether water was placed under it instead of the old dish of ether water. In this way the supply of free oxygen was maintained as well as the action of the ether; the amount of ether which could evaporate from a 5% water solution being a limited amount and not enough to exclude the oxygen from the bell-glass and the organisms.

This experiment was twice repeated and essentially the same results were obtained. In one case the *B* cultures when about 4 days old also emitted light, i. e., about 2 days after their daughter (*C*) cultures were luminous.

From these experiments it is clear that ether, when not too concentrated, exerts a partial narcosis on the bacteria. While it inhibits light production, it does not inhibit growth and multiplication and hence not all of the metabolic activities. In the case of ether we find a second adaptation of the organisms to environment.

Nutrition.

Naturally the first culture medium used for the culture of photobacteria was fish—the substratum from which they had been first isolated. Later the organisms were grown on agar and gelatine containing sea salt, peptone, asparagin, etc. The culture media best suited to cultivation of photobacteria are those first used by Beijerinck. These are described in a previous section of this paper as normal fish bouillon, fish agar and fish gelatine.

That nutrient conditions exert some effect on light production, we know from Beijerinck's researches. His results indicate that certain substances which are plastic are not photogenic and vice versa.

Further it seems for the six species studied by Beijerinck—which include those I have examined—part of the nitrogen must be furnished as peptone and in some cases all of the nitrogen may be given in this form. In some species (peptone forms) peptone will alone cover all the carbon and nitrogen requirements, while in other species (peptone-carbon forms), although peptone will suffice for the nitrogen needs, an additional source is needed for the carbon. *Bacillus phosphorescens* and *Microspira luminosa* are peptone forms, while *Bacterium phosphorescens* is a peptone-carbon form. In all cases, however, peptone seems to be a necessary part of the nutrient media.

ORGANIC NEEDS.

In order to test the conclusion of Beijerinck that peptone or a related protein was absolutely essential, a large series protein-free media were made up. These were inoculated with *Bacillus phosphorescens* and were kept under observation for from 4 days to one week. Aside from the various protein-free media of Cohn, Fraenkel, Gamaleia, Nägeli, Pasteur, Proskauer and Beck, and Uschinski, a large number of original synthetic media, free from protein, were devised. In almost all instances negative results were obtained, and hence it will be needless to detail all of the synthetic protein-free media employed.

In the following two media, growth was at times, although not always, obtained:

I.

Protogen, 1%.
$NaNO_3$, 1%.
in distilled water.

II.

Protogen, 1%.
Glycerol, 1%.
Glucose, 1%.
$NaNO_3$, 1%.
in distilled water.

In both of these media growth was slight and after 3 or 4 days entirely ceased. In no case, however, was any luminescence evident. The growth in medium I. was better than that in II. Protogen which formed the basis of these media is, however, a complex substance, the composition of which is hardly understood, and it may prove to be a protein compound.

While media containing peptone and needed inorganic salts will permit growth and luminescence, still the addition of certain amides causes a more luxuriant growth. These amides include asparagin, lactamid, isobutylamin, isovaleramid, and glycocoll. Asparagin is considered by Beijerinck to be specially stimulating to luminescence. In my experience, while it very much promoted growth, it did not cause the least increase in the intensity of the light produced. Leucin, tyrosin, and sodium asparaginate were apparently without effect. On the other hand, methylamin, hexamethylamin, hexamethyltetramin, uric acid, hippuric acid and alanin, all nitrogen containing compounds, were injurious since they either retarded growth and light production or entirely prevented growth.

The inorganic nitrogen compounds as a rule did not prove plastic or photogenic. Among ammonia compounds, only the valerianate accelerated growth; it did not, however, affect the light intensity. The following ammonium compounds proved either injurious or at least indifferent:—tartrate, bimalate, chloride, carbonate, nitrate, sulphate, phosphates, and aldehyde-ammonia.

Nitrate of sodium proved not alone plastic but particularly photogenic. The nitrates of potassium, lithium and calcium proved neither plastic nor photogenic.

In none of the synthetic media containing peptone, amides and inorganic salts, in which distilled water was used as the solvent, was the growth nearly as good as when, in place of the distilled water, fish extract was used as the solvent for the peptone, amides and inorganic salts. Evidently, while peptone may be an essential organic constituent of the nutrient media, it alone or with any of the plastic nitrogen compounds mentioned is not sufficient to produce the best growth of the organisms.

In order to determine whether perhaps a second form of carbon supply was needed, a series of sugars and related compounds were added to the media as secondary sources of carbon. When, in addition to peptone, 1% of either dextrose, lactose, cane sugar or dulcite, was added, the growth was a little more than that in the control without the sugar or the alcohol. Maltose (1%) at first accelerated growth, then retarded it, and later again caused acceleration. Arabinose and levulose retarded both growth and luminescence, while the presence of 1% of inulin was sufficient to entirely prevent growth. The glucosides arbutin, æsculin and agaracin retarded growth or were at least indifferent in their action. A number of additional organic compounds were experimented with. Among these protogen, lecithin, glycerol, sodium lactate, sodium phospholactate and sodium oleinate produced increased growth, but seemed without effect on light production. The following retarded growth: ethyl alcohol, butter, palmitin, stearin, cholestrin, camphor, turpentine, xylol, and citrus, olive, and bone oils.

Peptone and sea-salts dissolved in distilled water constituted a medium sufficient to enable the photobacteria to produce fully as intense a light as when fish or fish extract, peptone and sea salt, etc., were employed. The growth was, however, never as luxuriant in the purely synthetic media as in the media containing fish extract.

MINERAL NEEDS.

All observers have emphasized the fact that in order to insure the best growth a certain amount of sea salt must be added to the culture media. Beyond this nothing is known concerning the inorganic needs of the photobacteria. One great difficulty in the way of investigating mineral needs of luminous bacteria is the fact that peptone must form part of the nutrient medium. All preparations of peptone contain a considerable amount of ash. Grübler's purified peptone, which was the best at my disposal, contained about 1% of ash, while the Witte peptone, which was rarely employed, contains rather more than 1%. The ash of the Grübler peptone (that used in the following experiments) contains iron, barium, sodium and potassium. Since peptone is essential, it at first seemed very improbable that anything could be learned about the mineral needs of the bacteria.

The various culture media employed for preceding experiments have all contained a varying number of inorganic salts. The question then arose, might there not be enough mineral matter in the peptone to provide for its inorganic needs? Distilled water containing 1 or 2% of peptone, however, remained free from growth even a week after inoculation. When, however, 2% of sea salts was added to the 1% peptone water fairly good growth and a very strong luminescence were obtained. In order to learn whether the complete mixture of salts contained in sea water was necessary, or only certain of these, media were made up containing, in addition to 1% peptone, varying quantities of each of the salts in sea water.

Since NaCl constitutes the bulk of the sea salt, it was first experimented with. To a series of flasks containing 1% peptone in double distilled water, NaCl was added in amounts of .25, .5, 1, 2, 3, 5, 10 and 15 per cent, respectively. Each of these flasks of peptone and NaCl was inoculated with *Bacillus phosphorescens.* After 18 hours, growth was present in all of the media except the one containing .25% of NaCl. At no time within the course of the next ten days was any growth whatever to be found in this flask. The growth in the flasks containing .5, 10 and 15% of NaCl was very slight, that in the latter two being less than in the first. The growth continued in the cultures with 10% and 15% of NaCl for only a few days and then ceased entirely. Cultures containing 1%, 2% and 3% NaCl showed a luxuriant growth, which continued for nearly a week. In the cultures containing .5% and 5% NaCl, growth continued for 9 or 10 days.

While growth occurred in all except one of these peptone NaCl media, in only three was any luminescence to be observed. The cultures containing 1%, 2% and 3% NaCl all emitted a strong light. In none of the other cultures was light discernable at any time. The light in these three cultures was fully as bright as when the bacteria were grown in normal fish bouillon. The growth was not, however, quite as luxuriant. These experiments were repeated five times and yielded the same results.

Evidently, then, a single one of the ingredients of sea salt (NaCl) is sufficient for the needs of luminescence. Would any one of the other salts contained in sea water or belonging to the groups of alkali or alkaline earth metals do just as well as NaCl? To answer this question, to 1% peptone in distilled water I added the following amounts of $MgCl_2$: .1%, .25%, .5%, 1%, 2%, and 5%, respectively. In 18 hours, growth was evident in all of these except the one containing but .1% $MgCl_2$. Only those cultures containing 1% and 2% $MgCl_2$, however, became luminous. The light in these cultures appeared from 24 to 48 hours later than in the corresponding NaCl cultures and was rather weak.

Media in which KCl, $CaCl_2$, NH_4Cl, and $BaCl_2$ were employed in the place of NaCl remained perfectly clear for a week after inoculation. In addition to the above salts, the following were also used in the place of NaCl; KNO_3, K_2SO_4, $LiNo_3$, $RbSO_4$, $Ca(NO_3)_2$, and $Sr(NO_3)_2$. None of these were, however, even sufficient for growth of the organism—the media remaining perfectly clear for the week during which they were observed.

Two of the salts of sea water, NaCl and $MgCl_2$, are evidently of prime importance for the growth and light production of these bacteria, and are interchangeable. Further, the optimum amount of $MgCl_2$ approximates the optimum amount of NaCl. The remaining salts of sea-water are insufficient for the needs of the photobacteria. Not only is this so, but the addition of potassium or calcium salts to a peptone-NaCl medium appears to retard the growth and also light production.

The question then presented itself as to whether the metal or the haloid was the important element, or whether both were required. If other salts of sodium could replace the chloride, then the metal would be the important element. If this were not the case, then the chlorine ion or the entire molecule would be required. To test this I used $NaNO_3$ in the place of NaCl. Not only did I get growth in such media, but the light obtained with 1%, 2%, and 3% of the salt was even more intense than when the chloride had been used. Further, the minimum amount of $NaNO_3$, like that of NaCl, was .5%. Less than this was not sufficient for growth.

The sulphate of sodium, Na_2SO_4, was likewise found capable of replacing NaCl, and while the growth was fully as good as when NaCl was used, still the cultures did not become luminous as soon, nor were they as bright as when NaCl was used.

In addition to the chloride, the nitrate and the sulphate of sodium, ten other sodium salts were experimented with, namely:—monobasic phosphate, dibasic phosphate, sulphite, phospho-lactate, citrate, carbonate, acid carbonate, nitrite, tartrate, and bitartrate. Of these the first five when added to a 1% peptone solution were sufficient for growth, and, except the sulphite, were sufficient for luminescence. The remaining five salts were found not to be able to replace NaCl. This insufficiency is, however, in all probability, due to the character of the ion linked with the sodium rather than to the sodium ion itself, since eight of the thirteen salts of sodium investigated, when added in sufficient quantity to 1% peptone solution gave good growth.

Since $MgCl_2$ was capable of replacing NaCl, it seemed strange that the closely related KCl could not replace NaCl. In order to make sure that the insufficiency of KCl was not an osmetic one, media was made in which KCl and KNO_3 were added to peptone in quantities isoosmotic with 1, 2 and 3% of NaCl and $NaNo_3$, respectively. However, in no case was any growth to be observed even a week after inoculation.

Of the salts of sodium, the nitrate, chloride and sulphate are the best forms in which to furnish sodium to the bacteria. When the nitrate is used, a far brighter light is obtained than when any of the other salts are employed. The chloride is also used to better advantage than is the sulphate. The fact that the nitrate is more advantageous than the chloride of sodium indicates that the sodium need can hardly be a question simply of adaptation to its primitive invironment.

The Theory of Luminescence.

At present, those who have studied the luminous bacteria may fairly be said to be divided into two camps, one holding that luminescence is intracellular and that it is inseparably bound up with life, while the other considers it to be extracellular, and not inseparable from life—that it is capable of reproduction in the laboratory. Among those holding the intracellular view may be mentioned Pflüger, Beijerinck and Lehmann.

Radziszewski, Ludwig and Dubois believe in the extracellular theory. The observations at hand give almost equal support to both sides of the question, although the intracellular theory seems to have a little the better of the argument.

That light is an oxidation phenomenon, is pretty largely accepted by all students of the luminous bacteria. The questions to be settled are, however, numerous, e. g., what it is that is oxidized, the conditions of oxidation, how the light is produced by oxidation, and is the oxidation internal or external? We know that even in an abundant supply of fresh oxygen the photobacteria may be non-luminous. Further, continued growth and light production do not necessarily go hand in hand. We have seen that photogenic bacteria may grow at a high temperature without producing light, e. g. *Bacillus phosphorescens* will grow at 38°, but remains perfectly dark.

A culture of *Bacillus phosphorescens* does not emit light as soon as the first growth takes place. Usually it is not luminous until from 18 to 24 hours after inoculation. During this period the culture medium is seen to become more and more clouded with a white growth, and finally a white skin of bacterial growth covers the surface of the culture liquid. Then the culture becomes luminous. This is not due to contact with the air, because when the culture is luminous, it is luminous to a depth of 2 to 3 centimeters. Again we have seen how a certain amount of ether may prevent light production and yet not growth.

During the 18 hours immediately following inoculation, and before luminescence begins, the bacteria are actively swimming about the culture liquid. After light production begins not only are the bacteria of the surface skin motionless, but also those in the depths of the liquid. In no case have I observed light while the bacteria were motile, and conversely I have not been able to find the bacteria in motile condition while they were in a luminous condition. Indeed it would seem—at least for *Bacillus phosphorescens*—that light and motion are opposing functions, since they are not performed at the same time, but one follows the other.

As long as the bacteria are in motion, the culture has but little odor (unless fish extract has been used) and is of a light yellow color. Shortly after the culture becomes luminous, the color changes. First it becomes dark yellow, then it is light brown, then more and more reddish. By this time the odor is very marked and reagents are hardly needed to demonstrate the presence of the lower fatty acids and of skatole. And reagents confirm the olfactory evidence.

It has been shown that the elements sodium and magnesium are of importance for both light and growth of luminous bacteria. Just what the connection may be between the oxidation which causes light emission and sodium or magnesium is still a question needing further experimentation. That there is some connection is clear. A comparison of luminous bacteria with the electric ray is rather suggestive. The electric organ of the torpedo is known to be rich in NaCl, usually having as much as 3%. Further, it is commonly accepted that the electric organ is modified muscular or contractile tissue. In any case there is analogy between the bacterial contractile flagellæ and contractile animal muscle. Today physicists are pointing out the close connection between light and electricity. The large NaCl content in the electric (or modified contractile) organ of the torpedo on the one hand and the large sodium need of the photobacteria taken with the relations between light and motion on the other hand are full of significance.

With the facts at hand one may reasonably draw a few conclusions concerning the nature of light production. The fact that no luminous substance has ever been certainly isolated rather inclines one to disbelieve the extracellular theory. The fact that the temperature limits for life are without the limits for luminescence points to the intracellular theory. The fact that a slight amount of ether may cause a cessation of light emission and yet not stop growth points in the same direction.

While these facts lead us to strongly believe that luminescence is an internal (oxidation) process, yet there are not facts enough at hand to warrant the assumption that this process is inseparable from life and incapable of exact reproduction in the laboratory. The beautiful researches of Radziszewski show us the possibility of such a thing. Still it is yet to be proven that these same processes occur in the bacterium and are responsible for its luminesence. I see no warrant for Beijerinck's assumption that light is produced by sudden union of oxygen and peptone at the moment of conversion into living protoplasm. To begin with, it is still to be demonstrated that peptone is capable of *direct* conversion into protoplasm. Snythesis is not always a recapitulation of analysis.

To me it seems that luminescence is connected with metabolism, and since its appearance is closely followed by the presence in the culture liquid of the products of portein decomposition, that it is a phase of destructive metabolism. It also seems highly probable that the phenomenon of contractility (motility) and luminescence are closely related to one another, since the one appears when the other disappears. Further, it seems possible that the sodium ion may serve as a strongly reducing agent, possibly rendering oxygen atomic and so providing for a very active oxidation with consequent liberation of energy as light.

In the near future I expect to be able to test the hypothesis suggested in the latter part of this paper.

Summary.

In conclusion I may summarize the chief results of the experiments as follows:

1. All acids are injurious to light production. A slight excess of alkali is even more injurious than a slight excess of an acid.
2. The temperature limits for light emission are *within* those necessary for growth.
3. Change of temperature, either sudden or gradual, is without effect on luminescence, i. e., does not stimulate.

4. There is no luminescence at or below 0°.

5. Exposures to temperatures above the growth maximum are highly injurious to the power of light production, while exposure to very low temperatures seems to serve as a stimulus to light production.

6. *Bacillus phosphorescens* is capable of adapting itself to high temperatures, producing a race capable of light production at 35°, which is 5° above the normal maximum for luminescence.

7. A certain degree of continued illumination is without effect, and it is possible for the bacteria to live their entire lives in the dark and yet emit a brilliant light.

8. Ether acts as a narcotic, preventing luminescence, but not growth and multiplication.

9. It is possible to develop a race of bacteria so immune to the action of small amounts of ether as to be still luminous in its presence.

10. Peptone or related protein is required for the nutrition of luminous bacteria.

11. Dextrose, and certain of the higher sugars may be utilized advantageously by *Bacillus phosphorescens.*

12. Either sodium or magnesium is required for growth, and especially for light production. Minimum, maximum and optimum amounts of sodium are observed for growth and luminescence.

13. Potassium, ammonium, lithium, rubidium, calcium, barium and strontium cannot replace sodium (or magnesium).

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Vol. XV, pp. 235-238 December 16, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SOME GENERIC NAMES OF TURTLES.

By LEONHARD STEJNEGER.

I.

Merrem, in 1820, (Tentamen, p. 27) was the first author to give a generic name, viz: *Terrapene*, to the Emydine turtles with a movable plastron, which some earlier writers, such as Oppel (1811) and Cuvier (1817), had indicated as a section of the genus *Emys*. In the genus he included six valid species (his *T. boscii* being only a synomyne of *T. ornata*) as follows:

(1) *T. odorata* (+ boscii),
(2) *T. pennsylvanica*,
(3) *T. amboinensis*,
(4) *T. tricarinata*,
(5) *T. nigricans*,
(6) *T. clausa*.

Two years later Fleming (Philos. Zool. II, p. 270) apparently without knowing Merrem's work, gave the name *Cistuda* to the same group of turtles, without mentioning any species whatsoever. This makes it an unconditional synonym of *Terrapene*, a conclusion quite in consonance with Say's use of Fleming's name in 1825 (Journ. Phila. Acad., IV, ii, p. 205) for the species *C. clausa*, *C. pennsylvanica*, and *C. odorata*.

In 1824, Spix (Testud. Brasil., p. 17) instituted the genus *Kinosternon*, thus taking out of Merrem's *Terrapene* his *T. tricarinata*.

J. E. Gray in a paper entitled "A Synopsis of the Genera of

Reptiles and Amphibia" (Ann. Philos. (n. s.) X, pp. 193 seqv.) published in September, 1825, subdivided Merrem's genus and fixed *T. clausa* definitely as the type of *Terraphene*, as he spelled it. *Kinosternon* he also adopted as proposed by Spix, and in addition he instituted for *T. odorata* and *T. pennsylvanica*, a new genus for which he used a manuscript name by Bell. viz, *Sternotherus*.

Both of the species which constitute his new genus being congeneric with the type of *Kinosternon*, *Sternotherus* becomes an unconditional synonym of the latter.

Thomas Bell, whose MSS. name Gray had thus been appropriating, scarcely more than a month later (Zool. Journ., II, No. 7, Oct. 1825, p. 305) used the same name (though spelt slightly different, *Sternothaerus*) in a somewhat different sense, including in it, besides *T. odorata* and the conspecific *T. boscii*, two new species *S. trifasciatus* and *S. leachianus*. This action ties the name *Sternotherus* down to *T. odorata*, if the latter be considered generically distinct from *Kinosternon*, thus antedating *Aromochelys*.

The genus which is now usually known as *Sternothærus*, therefore, must have another name, and *Pelusios* of Wagler (Nat. Syst. Amph., 1830, p. 137) becomes available with *P. nigricans* for type.*

The synonymies of these genera, as here mentioned, would then stand as follows:

Terrapene Merrem.

1820. *Terrapene* Merrem, Tent. Syst. Amph., p. 27 (type, as restricted by Gray, Sept., 1825, *T. clausa*).

1822. *Therapene* Schinz, Cuvier's Thierr. Uebers., II, p. 13 (emend.).

1822. *Cistuda* Fleming, Philos. Zool., II, 270 (no species mentioned).

1825. *Terraphene* Gray, Ann. Philos. (n. s.) X, Sep., p. 211 (err. typogr.).

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*If *Sternotherus* had not been disposed of by Gray in 1825, it would have stood for the genus now known as *Cyclemys*, since Wagler in 1830 clearly restricted it to *C. trifasciata* a whole year before Gray applied it exclusively to *Pelusios nigricans*.

Kinosternon Spix.

1824. *Kinosternon* Spix, Testud. Brasil., p. 17 (type *K. longicaudatum* + *K. brevicaudatum* = *Testudo scorpioides* = *Terrapene tricarinata* Merrem).

1825. *Sternotherus* Gray, Ann. Philos. (n. s.) X, Sep., p. 211 (type *S. odoratus*).

1825. *Sternothærus* Bell, Zool. Journ., II, p. 305 (type *S. odoratus*).

1829. *Sternoteirus* Gravenhorst, Delic. Mus. Vratislav., p. 17 (emend.).

1855. *Aromochelys* Gray, Cat. Shield Rept. Brit. Mus., I, p. 46 (*A. odoratum*).

Pelusios Wagler.

1830. *Pelusios* Wagler, Nat. Syst. Amph., p. 137 (type *Emys castanea* + *E. subnigra* = *Terrapene nigricans* Merrem).

1831. *Sternotherus* Gray, Synops. Rept., p. 37 (same type) (not of 1825).

Cyclemys Bell.

1830. *Sternothaerus* Wagler, Nat. Syst. Amph., p. 137 (type *S. trifasciatus*) (not of Bell 1825).

1834. *Cyclemys* Bell, Proc. Zool. Soc. London, 1834, p. 17 (type *C. orbiculata*).

II.

Gray's generic name *Nicoria* is plainly untenable being antedated by the same author's *Geoemyda*.

The type of the latter has been believed to be *G. spinosa*, but as I am going to show, this assumption is entirely erroneous. The type of *Geoemyda*, on the contrary, is undoubtedly *G. spengleri* which is so characterized in the original communication establishing the name in the following words (Proc. Zool. Soc. London, 1834, p. 99):

"Specimens were exhibited of several *Reptiles*, which were accompanied by notes by Mr. Gray. These notes were read:

"Mr. Gray regards the Testudo Spengleri, Walb., as the type of a new genus of *Emydidæ*......

"From the beautiful figure of the animal of *Em. spinosa* given by Mr. Bell in his 'Monograph of the Testudinata' Mr. Gray is inclined to believe that this species belongs to the same genus with *Em. Spengleri*."......

As will be seen nothing could be more explicit. The genus was also so accepted by contemporary authors as shown by Bonaparte's use of the emended name *Geoemys* in 1837 with *G. spengleri* as the only species.

That Gray himself afterwards (1855) shifted the name to *G. spinosa* has nothing to do with the case, except that it necessitates the coining of a new name for the genus for which the latter species stands as type. As a substitute I would propose *Heosemys** with the three species *Heosemys spinosa*, *grandis* and *depressa*.

The synonymy of the two genera would then stand as follows:

Heosemys Stejneger.

1855. *Geoemyda* Gray, Cat. Shield Rept. Brit. Mus., I, p. 16 (type *G. spinosa*) (not of 1834).

1902. *Heosemys* Stejneger, Proc. Biol. Soc. Washington, XV, Dec., 1902, p. 216 (same type).

Geoemyda Gray.

1834. *Geoemyda* Gray, Proc. Zool. Soc. London, 1834, p. 100 (type *Testudo spengleri*).

1837. *Geoemys* Bonaparte, Mag. Zool. Botan., II, No. vii, p. 60 (emend.; same type).

1855. *Nicoria* Gray, Cat. Shield Rept. Brit. Mus., I, p. 17 (same type).

1869. *Melanochelys* Gray, Proc. Zool. Soc. London, 1869, p. 187 (type *M. trijuga*).

1876. *Chaibassia* Theobald, Cat. Rept. Brit. Ind. (p. 6) (type *Ch. tricarinata*).

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*From ἕως, East and *εμυς*, turtle, formed in analogy to ἕωςφο′ρος.

VOL. XV, PP. 239-240 DECEMBER 16, 1902

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A SALAMANDER NEW TO THE DISTRICT OF COLUMBIA.

BY LEONHARD STEJNEGER.

I wish to place on record the capture of a species of *Ambystoma* additional to those enumerated in Prof. W. P. Hay's "List of the Batrachia and Reptiles of the District of Columbia" (Proc. Biol. Soc., Washington, XV, 1902, pp. 121-145), viz: *Ambystoma maculatum* (Shaw). A large specimen was caught at Twining City, D. C. on Oct. 19, 1902, by Mr. A. E. Thorn, and is now in the National Museum (No. 30,906).

Ambystoma maculatum is usually known as *A. punctatum* (Linnæus), being the *Lacerta punctata* of the twelfth edition of the Systema Naturæ. This name was preoccupied by Linnæus himself in the tenth edition for a true lizard, now known as *Riopa punctata*. Its use is therefore precluded. The next name in time is Bechstein's *Salamandra palustris*, but this name was also preoccupied the year previously by Schneider for the female yellow-spotted Salamander of Europe. Shaw's *Lacerta maculata* is the next name in time, and is apparently not preoccupied. These names are absolutely equivalent, being all based on Catesby's "Car. 3, p. 10, t. 10, f. 10." The synonymy of this species, consequently, will stand as follows:

Ambystoma maculatum (Shaw).

1766. *Lacerta punctata* Linnæus, Syst. Nat., 12 ed., I, p. 370 (type loc. "Carolina") (not of 1758).

1800. *Salamandra palustris* Bechstein in Lacépède's Naturg. Amphib., II, p. 544 (substitute name) (not of Schneider 1799).

1802. *Lacerta maculaa* Shaw, Gen. Zool., III, i, p. 304 (substitute name).

1803. *Salamandra venenosa* Daudin, Hist. Nat. Rept., VIII, p. 229 (type loc. "near Philadelphia").

1804. *Lacerta subviolacea* Barton, Amer. Philos. Trans., VI, i, p. 109, pl. iv, fig. 6 (type loc. "a few miles from the city of Philadelphia)".

1850. *Ambystoma carolinæ* Gray, Cat. Batr. Grad. Brit. Mus., p. 35 (substitute name).

1854. *Ambystome argus* Duméril and Bibron, Erpét. Gén., IX, p. 103 (substitute name).

1854. *Salamandra margaritifera* MS. Mus. Paris, fide Duméril and Bibron, op. cit. p. 105.

This salamander has costal grooves as indicated for *Ambystoma opacum*, by Professor Hay in his "Key to the species of *Caudata*," but the two species may be distinguished easily by their color alone, *Ambystoma opacum* being black with bluish gray cross-bars above, while *A. maculatum* is black with one series of large rounded yellow spots on each side of the back.

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PROCEEDINGS

OF THE

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THREE NEW SKUNKS OF THE GENUS SPILOGALE.*

BY ARTHUR H. HOWELL.

A study of the skunks of this genus reveals three apparently undescribed forms, which, in advance of a more formal paper on the genus, are here briefly characterized.

Spilogale tenuis sp. nov.

Type from Arkins, Colorado, ♂ adult, No. 99,365, U. S. Nat. Mus., Biological Survey Collection. Collected Nov. 13, 1899, by R. S. Weldon. Original number, 2198 X.

General characters.—Similar in markings to *Spilogale leucoparia*, but lateral stripes narrower; frontal patch long and narrow (in type specimen, 32x16 mm.); terminal third of tail white.

Skull.—Similar in general shape to that of *indianola*, but longer, and relatively narrower; braincase broad, and very flat; rostrum, postorbital region, and anterior portion of braincase very narrow; palate long.

Measurements.—Type: total length, 450; tail vertebræ, 165; hind foot, 51. Skull (of type): basilar length of Hensel, 52; zygomatic breadth, 34.7; mastoid breadth, 32.5; interorbital breadth, 14.3.

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*If the rule for fixing generic types recently promulgated by a number of working zoologists (see Science, N. S., Vol. XVI, p. 114, July 18, 1902) be generally adopted, as seems probable, the name *Spilogale* will have to be used for the little spotted skunks, instead of *Mephitis*, the name which I advocated in my previous paper in the present volume (pp. 2-6).

Remarks.—This species differs strikingly in external characters from *Spilogale interrupta* of the plains, while from *leucoparia* and *gracilis* it may be readily distinguished by its skull characters. It is apparently a mountain animal, but is at present known from only two localities—Arkins and Estes Park, Colorado.

Spilogale angustifrons sp. nov.

Type from Tlalpam, Valley of Mexico, ♂ adult, No. 50,825, U. S. Nat. Mus., Biological Survey Collection. Collected Dec. 15, 1892, by E. W. Nelson and E. A. Goldman. Original number, 4035.

General characters.—Size small; coloration as in *S. ambigua*, but usually without the white bands on thighs. Skull slender, and without prominent ridges.

Skull.—Similar to that of *ambigua*, but smaller and narrower; cranium highly arched; rostrum narrow; audital bullæ relatively large and high; molars smaller than in *ambigua*, the carnassial teeth decidedly so.

Measurements.—Average of 3 adult males from type locality: total length, 345; tail vertebræ, 130; hind foot, 40. Skull (of type): basilar length, of Hensel, 43; zygomatic breadth, 31.3; mastoid breadth, 27.5; interorbital breadth, 13.

Remarks.—This form belongs with the group of narrow-skulled species inhabiting the eastern United States, in which group *ambigua* also belongs. Intergradation with the latter species is probable, though no intermediate specimens have been examined. The present form occupies the southern portion of the Mexican table-land, from Guanajuato to Chiapas.

Spilogale angustifrons tropicalis subsp. nov.

Type from San Mateo del Mar, Oaxaca, ♂ adult, No. 73,523, U. S. Nat. Mus., Biological Survey Collection. Collected May 16, 1895, by E. W. Nelson and E. A. Goldman. Original number, 7958.

General characters.—Similar to *angustifrons*, but larger; skull with smaller teeth and larger mastoid capsules.

Skull.—Larger and more angular than that of *angustifrons;* mastoid capsules more inflated; audital bullæ flatter; rostrum broader; upper molars and last lower molars relatively smaller.

Measurements.—Average of 3 adult males from type locality: total length, 378; tail vertebræ, 144; hind foot, 44.7. Skull (of type): basilar length of Hensel, 47; zygomatic breadth, 33; mastoid breadth, 30.5; interorbital breadth, 14.5.

Remarks.—This form occupies the tropical lowlands of Oaxaca, intergrading apparently with *angustifrons* in the neighborhood of Tehuantepec. Its skull resembles that of *ambigua* quite closely, but has decidedly smaller teeth and larger mastoid capsules.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW BAT FROM THE ISLAND OF DOMINICA.*

BY GERRIT S. MILLER, JR.

Among some West Indian bats collected for the United States National Museum by Mr. H. Selwyn Branch are twenty-five specimens of a *Myotis* from Dominica which represent a species related to *M. nigricans* and *M. nesopolus*, but distinct from either. It may be known as:

Myotis dominicensis sp. nov.

Type.—Adult male (in alcohol), No. 113,564, United States National Museum. Collected on the Island of Dominica, West Indies, July 20, 1901, by H. Selwyn Branch.

Characters.—Similar to *Myotis nigricans* from Brazil and Paraguay, but smaller; skull with faceline more abruptly elevated above level of rostrum.

Color.—After immersion in alcohol for sixteen months the fur is uniform prouts brown above, and slightly tinged with burnt umber below, the hairs of the back indistinctly blackish at extreme base, those of the underparts slaty black through proximal half. Everywhere a wash of broccoli brown is visible in certain lights. Ears dull brown; membranes blackish.

Skull and teeth.—The skull is distinctly smaller than that of *Myotis nigricans*, but in form the only tangible peculiarity appears to be the more abrupt angle at which the forehead rises above the level of the rostrum. The skulls are so small that this angle is difficult to measure, but it is approximately 18° in *M. nigricans* and 26° in *M. dominicensis.* The teeth of the Dominican animal are smaller than those of *Myotis nigricans.* The crowns of the upper molars are slightly broader relatively to their length, and the hypocone of the first and second is less developed. Small premolars both above and below less crowded than in the related species.

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Measurements.—External measurements of type: total length, 63 (78)*; head and body, 36 (45); tail vertebræ, 27 (33); tibia, 12.4 (14); foot, 7 (7); forearm, 32.4 (33); first digit, 6.4 (6); second digit, 28 (30); third digit, 48 (56); fourth digit, 41 (45); fifth digit, 37 (40); ear from meatus, 11 (—); ear from crown, 8 (—); width of ear, 6 (—).

Cranial measurements of type: greatest length, 12.4 (13)*; basal length, 11.2 (12); basilar length, 9.4 (10); zygomatic breadth, 7.2 (7.4); interorbital constriction, 3 (3.6): mandible, 8.8 (9.4); maxillary toothrow (exclusive of incisors), 5 (5.4); mandibular toothrow (exclusive of incisors); 5 (5.4).

Specimens examined.—Twenty-five, all from the Island of Dominica.

Remarks.—In all external features except size *Myotis dominicensis* appears to agree perfectly with *M. nigricans.* The cranial and dental characters which separate the two species are very constant in an excellent series of specimens of each form. From the *Myotis nesopolus* of Curaçao the Dominican bat may be distinguished by its much more slender skull and smaller audital bullæ.

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*Measurements in parenthesis are those of an adult male *Myotis nigricans* (No. 105,621) taken near Sapucay, Paraguay.

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PROCEEDINGS

OF THE

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TWO NEW TROPICAL OLD WORLD BATS.*

BY GERRIT S. MILLER, JR.

Among the Old World bats in the United States National Museum are representatives of two forms of Molossidæ that have not hitherto been described. Both are insular representatives of well known continental species.

Nyctinomus pusillus sp. nov.

Type.—Adult female (in alcohol), No. $\frac{37852}{20997}$, United States National Museum. Collected on Aldabra Island, Indian Ocean, by Dr. W. L. Abbott.

Characters.—Externally similar to *Nyctinomus pumilus.* Skull and teeth noticeably smaller than in the related species.

External features.—In size as well as in details of external form *Nyctinomus pusillus* agrees so closely with *N. pumilus* as to need no description.

Skull and teeth.—The skull is similar to that of *N. pumilus* except that it is smaller and more lightly built, the interorbital profile is more concave, the basisphenoid pits are better defined, and the interpterygoid space is relatively wider. Teeth much smaller than in *N. pumilus* and inner segment of upper molars relatively broader, so that the protocone and hypocone of the first and second are actually further apart than in the larger species.

Measurements.—External measurements of type: total tength, 84; head and body, 53; tail, 31; tibia, 11; foot, 7.8 (7); forearm, 46.6; first digit, 6.4; second digit, 35; third digit, 70; fourth digit, 58: fifth digit, 34; ear from meatus, 15.4; ear from crown, 10; width of ear, 14.

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in recent years, yet Bow Island is a small atoll in the South Pacific, one of a large number of coral islets composing the Paumotu chain, and withal a most unlikely place for any member of either the *Dicæidæ* or *Fringillidæ.*

Darwin (Zool. Voy. 'Beagle,' Birds, 1841, p. 105), in concluding his account of the Galapagos finches refers to the present bird, as follows: "I may here mention that a third and well characterized species of Cactornis has lately been sent by Captain Belcher, R. N. to the Zoological Society; as Capt. Belcher visited Cocos Island, which is the nearest land to the Galapagos Archipelago, being less than 400 miles distant, it is very probable that the species came thence." As we now know something of the ornis of Cocos Island, Darwin's suggestion would lead us to suspect the lately described *Cocornis agassizi* Townsend (Bull. Mus. Comp. Zool., XXVII, 1895, p. 123, pl.), to be identical with *Pinaroloxias inornata,* and a comparison between a female of the former and Sharpe's description (Catal. Birds Brit. Mus., X, p. 52) of the latter, actually proves them to be one and the same species. That there was some uncertainty about the habitat of *Cactornis inornata* at the time Darwin wrote is evident from his surmise that Cocos Island was its true home. From the foregoing it will be seen that the ornis of Polynesia can no longer claim *Pinaroloxias inornata,* which name should in future be applied to the Cocos Island bird.—*Charles W. Richmond.*

The common Nyctinomus of the Greater Antilles.

In the original description of *Nyctinomus antillularum,* the common free-tailed bat of the Lesser Antilles (Proc. Acad. Nat. Sci., Philadelphia, 1902, p. 398, September 12, 1902), I compared the species with the related form occurring in the Greater Antilles, but neglected to mention the technical name of the latter. This is *Nyctinomus musculus* Gundlach (Monatsber. k. Preuss. Akad. Wissensch, Berlin, 1861, p. 149), based on Cuban specimens. The animal is readily distinguishable from all of the known continental members of the *Nyctinomus brasiliensis* group by its smaller size, shorter ear, and rudimentary, peg-like anterior lower premolar.—*Gerrit S. Miller, Jr.*

Lophostoma venezuelæ changed to Tonatia venezuelæ.

In publishing a paper in conjuction with Capt. Wirt Robinson, on a collection of mammals made in the vicinity La Guaira, Venezuela, Proc. U. S. Nat. Mus., XXIV p. 154, Oct. 3, 1901, I overlooked Dr. Palmer's "Random notes on the nomenclature of the Chiroptera," Proc. Biol. Soc. Wash., XII p. 111, April 30, 1898, where he shows that *Lophostoma* D'Orbigny 1836 is antedated by *Tonatia* Gray 1827. The bat described from near La Guaira as *Lophostoma venezuelæ* should stand as *Tonatia venezuelæ* (Robinson and Lyon)—*Marcus W. Lyon, Jr.*

The external characters of Brachyphylla nana Miller.*

The United States National Museum has recently procured by exchange with the Field Columbian Museum two complete specimens of *Brachyphylla nana* from a cave on the south coast of the Province of Santiago, Cuba. As this bat was originally described from an imperfect skull (Miller, Proc. Acad. Nat. Sci., Philadelphia, 1902, p. 409, September 12, 1902) the external characters of the species have hitherto been unknown. In general appearance the Cuban animal resembles true *Brachyphylla cavernarum* from St. Vincent more closely than the peculiarities of its skull would lead one to expect. The only tangible differences appear to be the smaller general size of the Cuban species, and its broader, flatter noseleaf. The light basal area of the fur is grayish white in *B. nana* and dirty yellowish white in the specimens of *B. cavernarum* that I have examined, but as all have been submitted to the action of preservative fluids this seeming difference may have no real basis. Measurements of an adult female of each species (those of *B. cavernarum* in parenthesis): head and body, 83 (93): tibia, 25 (29); foot, 15 (18.6); forearm, 60 (66); first digit, 12.4 (16); second digit, 48 (53); third digit, 102 (115); fourth digit, 80 (92); fifth digit, 80 (88); ear from meatus, 22.6 (23); ear from crown, 17 (18): width of ear, 14 (15).—*Gerrit S. Miller, Jr.*

An overlooked specimen of Chilonycteris psilotis.

In 1878 Dobson described an American bat as *Chilonycteris psilotis*, basing his account on two specimens without history in the British Museum (Catal. Chiropt. Brit. Mus., p. 451, pl. XXIII, fig. 2). Apparently nothing more has been published about the animal. While re-arranging some bats in the United States National Museum I recently found an adult male of this species, (No. 9870), collected in 1858 by Dr. F. Sumchrast, on the Isthmus of Tehuantepec, Mexico. Its characters agree in all respects with those given by Dobson, except that the forearm and tibia are somewhat longer than in the type. Skull scarcely distinguishable from that of *Dermonotus fulvus*, therefore much more robust than in the small West Indian species of *Chilonycteris*. Teeth uniformly smaller than those of *Dermonotus fulvus*, and upper incisors separated from canine by a distinct space, not as wide, however, as that between the same teeth in *Chilonycteris macleayi*. Measurerments: Total length, 62; head and body, 46; tail, 16; tibia, 17; foot, 9 (8); forearm, 44; thumb, 8; second digit, 37; third digit, 71; fourth digit, 50; fifth digit, 47; ear from meatus, 15.8; ear from crown, 11.4; width of ear, 7; greatest length of skull, 15; basal length, 12.6; basilar length, 11.6; zygomatic breadth, 8.2; breadth of braincase above roots of zygomata, 8.—*Gerrit S. Miller, Jr.*

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A second specimen of Pterygistes azoreum Thomas.

The United States National Museum contains an adult female of *Pterygistes azoreum* Thomas, a bat otherwise known from the type only, a male collected on the Island of St. Michael, and now in the British Museum. It was taken on the Island of Terceira, November 7, 1894, by Dr. Wm. Trelease, and agrees closely with the characters given in the original description, except that the forearm is longer and the foot smaller than in the type. Measurements (those in parenthesis are of the British Museum specimen): total length, 97 (96); head and body, 50 (54); tail, 43 (42); tibia, 16.6 (17); foot, 7; foot without claws, 6 (7.7); forearm, 42 (37); thumb, 6; second digit, 42; third digit, 72 (62); fourth digit, 59; fifth digit, 48 (43.7); ear from meatus, 12 (12); ear from crown, 10; width of ear, 11; greatest length of skull, 14.6 (14.2); basal length, 14; basilar length, 12 (11); zygomatic breadth, 9.6 (9.4); interorbital constriction, 4.6 (4.4); mandible, 10.4; maxillary toothrow (exclusive of incisors), 5.4 (5.1); mandibular toothrow (exclusive of incisors), 6.—*Gerrit S. Miller, Jr.*

The status of Nyctinomus nevadensis (H. Allen).

In March, 1894, Harrison Allen described a freetailed bat of the genus *Nyctinomops*, from "Nevada and California," as *Nyctinomus macrotis nevadensis* (Monogr. Bats N. Amer. p. 171, March 14, 1894). A few months later J. A. Allen showed that the animal is specifically distinct from the West Indian *Nyctinomus* (=*Nyctinomops*) *macrotis* (Bull. Amer. Mus. Nat. Hist., VI, pp. 326-328, November 7, 1894). Both writers apparently overlooked the fact that this bat had already been described by Ward from Mexican material as *Nyctinomus depressus* (Amer. Nat., XXV, p. 747, August, 1891). Having examined several Mexicans specimens which perfectly agree with Harrison Allen's type and with Ward's very detailed discription, I have no hesitation in placing *Nyctinomus macrotis nevadensis* H. Allen as a synonym of *Nyctinomops depressus* (Ward).—*Gerrit S. Miller, Jr.*

The generic position of Nyctinomus orthotis H. Allen.

Among the bats of the genus *Nyctinomops* I recently mentioned the Jamaican *Nyctinomus orthotis* of Harrison Allen (Proc. Acad. Nat. Sci., Philadelphia, 1902, p. 393, September 12, 1902). This I did quite inadvertently, as the species is in reality a member of the genus *Promops*, closely allied to the Central American *P. glaucinus*. It should stand, therefore, as *Promops orthotis* (H. Allen).—*Gerrit S. Miller, Jr.*

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